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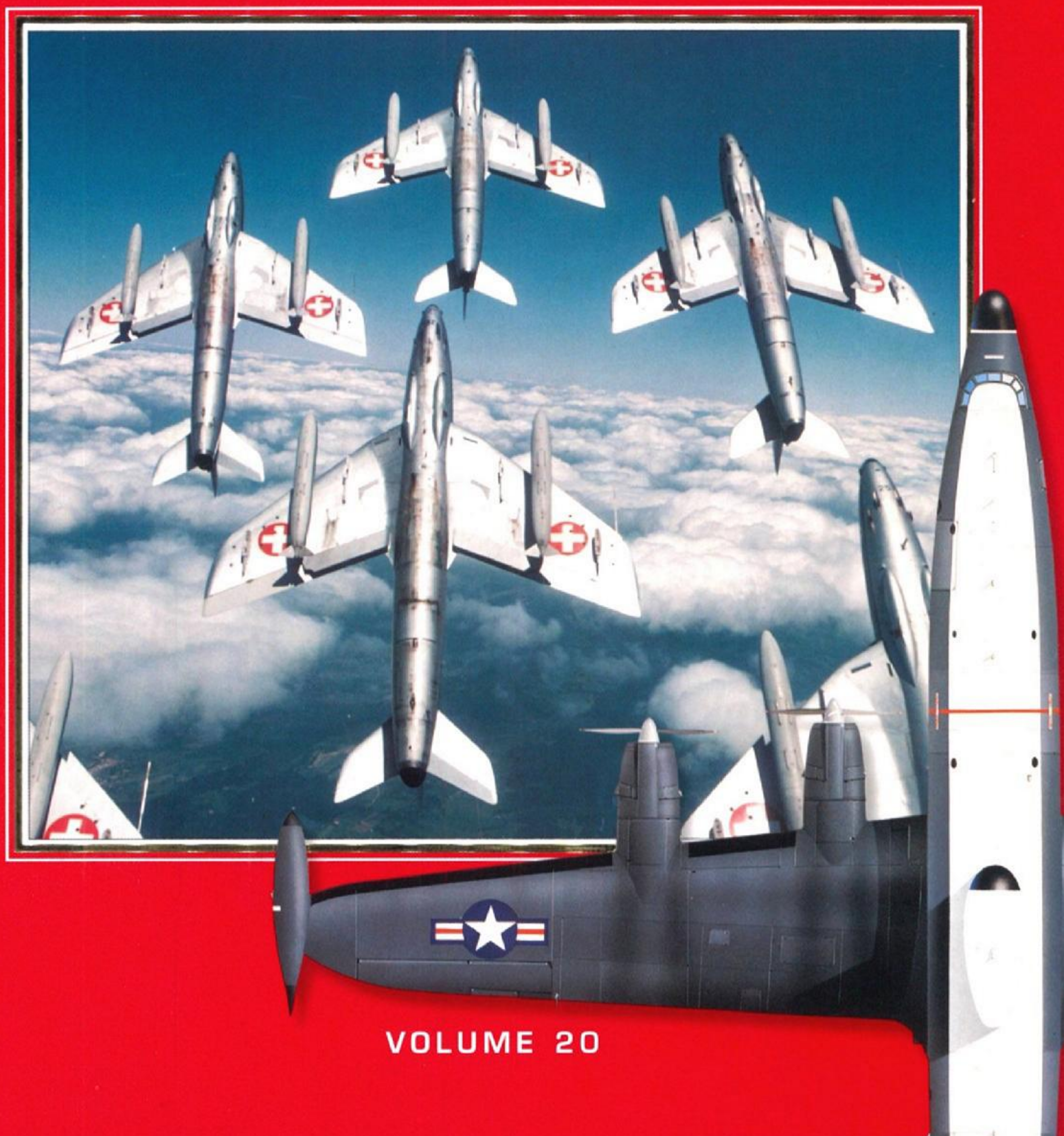
THE JOURNAL OF CLASSIC COMBAT AIRCRAFT



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Gordon Swanborough, 1927-2000

It is with deep sadness that we report the passing away of Gordon Swanborough after a long illness. Through his work with Bill Green on *Flying Review* and *Air International*, and his many books, Gordon inspired many of us in our younger years to pursue aviation publishing as a career. Throughout Aerospace Publishing's first 20 years, Gordon played a crucial role in our many publications, and remained a good friend to this company throughout. As well as allowing us to draw on his lifelong experience in the business and phenomenal knowledge of aircraft, we are indebted to Gordon for his patience with us and generosity towards us, which never flagged. Our thoughts and sympathies go out to his family.

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RAF Coastal Command

Watching home waters

Maritime operations, 1945-1982

Derived from the Avro Lincoln, the Shackleton was the RAF's first truly capable maritime patrol/ASW platform.

Westland's Whirlwind was the RAF's first dedicated SAR helicopter. The service quickly realised the importance of helicopters in the role.

Post-war, Coastal Command was forced to adjust to a new threat. The USSR seemed poised to strike with massive surface and submarine naval assets and the Command was urgently re-equipped for a new and potentially devastating war.

Coastal Command underwent a period of expansion and re-equipment from 1951, followed by six years of retrenchment in which the forces under its control faced many obligations but possessed strictly limited resources with which to meet them. Its main function during that period, as the Air Ministry had outlined to the Commander-in-Chief, Sir Leonard Slatter, in September 1946, was to study and develop modern methods of achieving the prime objectives of a maritime air force: the defence of friendly shipping at sea against all forms of attack other than air attack, and the location and destruction of enemy surface and underwater craft.

Secondary responsibilities were the co-ordination and control of all air-sea rescue operations in the sea areas around the United Kingdom and Gibraltar, and operational and administrative control of the meteorological and home-based photographic reconnaissance squadrons, the latter being part of the Central Photographic Establishment, previously known as No. 106 (PR) Group. Furthermore, Coastal Command might be asked to provide aircraft and crews to assist in air transport operations in an emergency.

The Command's resources had begun to contract immediately after the end of World War II in Europe, the intention then being to retain a small nucleus of maritime aircraft in the United Kingdom, while transferring a number of squadrons to the Far East for air-sea rescue and transport work in the war against Japan, handing over others to a rapidly-expanding Transport Command, and disbanding the remainder. With the surrender of Japan, the rundown began in earnest, as in other commands, so that by October 1946 Coastal Command had been reduced to two group headquarters, No. 18 at Pitreavie Castle and No. 19 at Plymouth and the equivalent of two other groups in the form of RAF Northern Ireland at Aldergrove and the Central Photographic Establishment at Benson.

The command's front-line strength in October 1946 amounted to 50 aircraft in two squadrons of flying-boats, four land-based squadrons of general reconnaissance aircraft and two medium-range strike squadrons, each unit being established on a cadre basis with no more than five aircraft on a flying-boat squadron, six on a land-based squadron and eight on a strike squadron, a strength that would permit rapid expansion if the need arose.

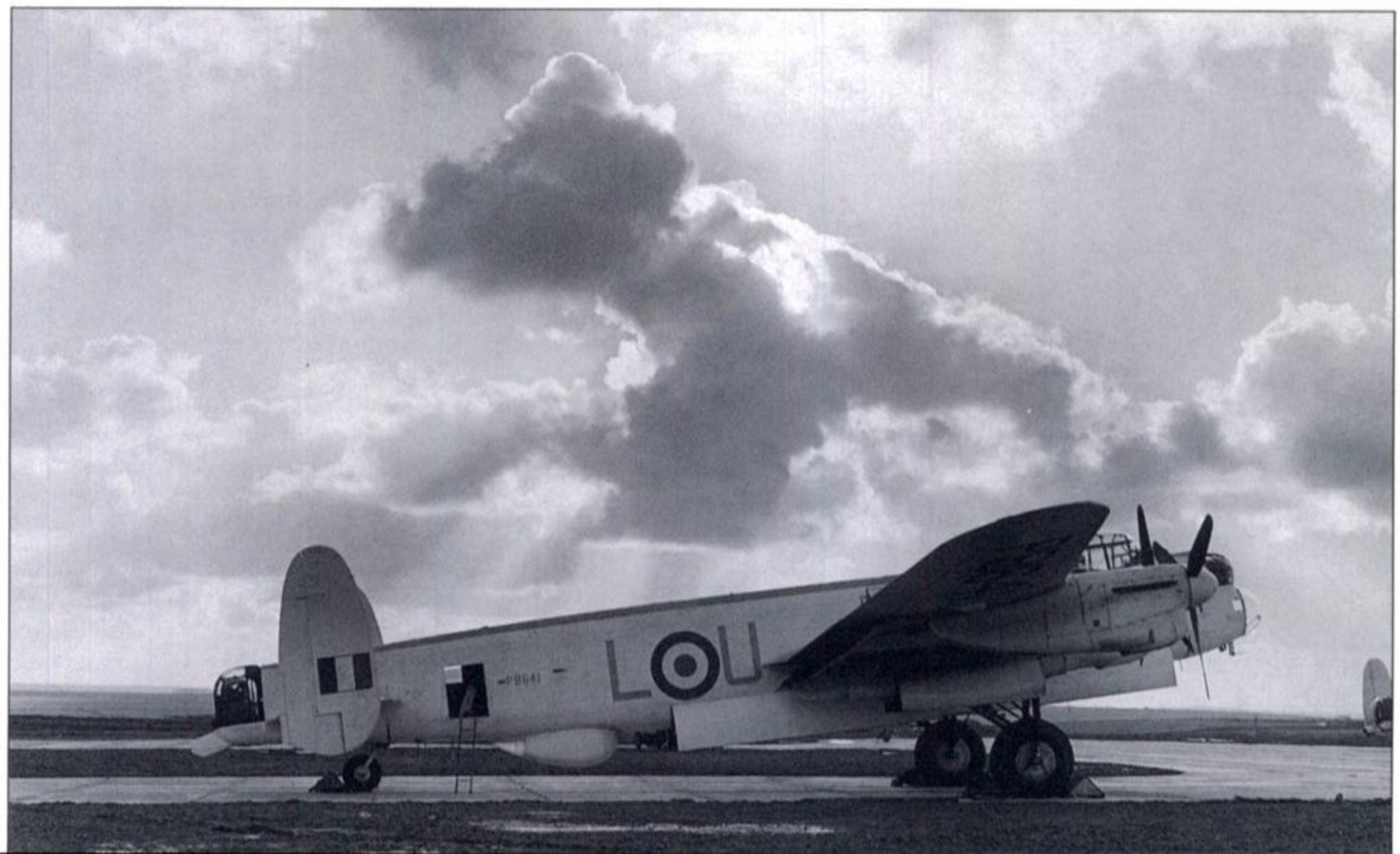
Met and PR assets

In addition Coastal Command controlled No. 202 Squadron (numbered No. 518 until October 1946) whose Handley Page Halifax Mk 6s flew meteorological reconnaissance sorties from Aldergrove and Gibraltar; and the de Havilland Mosquitoes, Supermarine Spitfires and Avro Lancasters of the two photo-reconnaissance squadrons, Nos 58 and 82 (numbered Nos 540 and 541 until October 1946).

As in the RAF as a whole, Coastal Command's immediate problem in the late 1940s was to balance commitments against limited resources. In common with other commands it had to suffer the dire consequences of the rapid rundown in 1945 and 1946, particularly in the loss of aircrew and skilled tradesmen. Consequently, although its front-line strength had been substantially reduced, it still did not have the manpower needed to produce the number of flying hours with which to meet its commitments. With priority afforded to meteorological flights and photographic survey work, the hours available for specialised training in maritime operations were strictly limited, a situation that could be accepted only because the risk of war in the immediate future was considered to be very small.

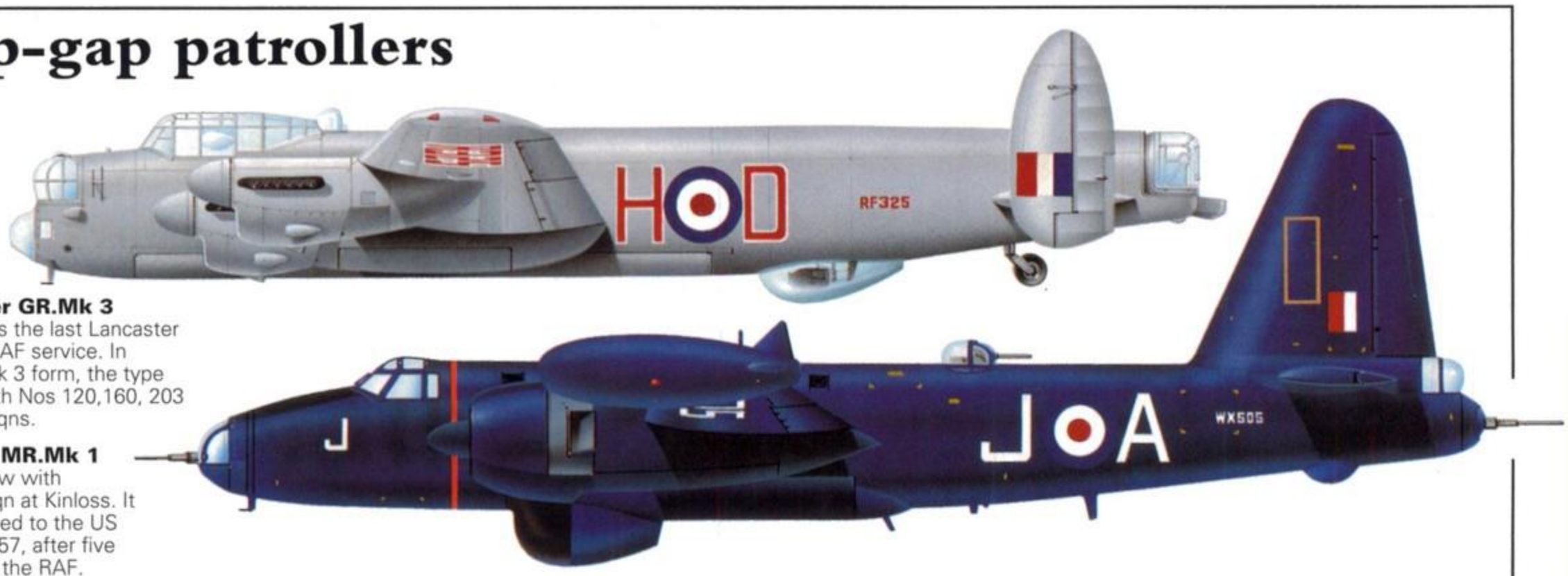
Despite its limited resources Coastal Command was still able to maintain an effective training organisation to match the demands made of maritime crews in terms of skills, patience and endurance throughout long over-water patrols. All operational conversion was concentrated at No. 236 Operational Conversion Unit (OCU) at Kinloss in 1947; crews destined for a long-range general reconnaissance squadron were given a 16-week course there, including instruction in maritime reconnaissance, ship recognition, weaponry and the use of the latest (sic) search and

With underwing radomes housing the scanners of its ASV Mk VIC radar, the Sunderland GR.Mk 5 served Coastal Command faithfully until the last was retired in May 1959. As well as serving admirably in the maritime patrol role around the UK, the Sunderland saw active service during the Korean War and over the seas off Malaya. The aircraft illustrated was photographed overflying a Royal Navy 'Colossus'-class carrier, probably in the late 1940s. Note that its defensive armament, including the entire mid-upper turret, has been removed – standard practice in peacetime.



Left: As the Lend-Lease VLR Liberators were returned to the US or scrapped, the RAF found itself with a yawning gap in its maritime capability. A number of Lancasters was therefore converted by Cunliffe-Owen to GR.Mk 3, later MR.Mk 3, standard. The type served as a useful stop-gap until the Shackleton and Neptune entered service. The Lancaster MR.Mk 3 also enabled Coastal Command to claim the last RAF Lancaster in service, when the final 'Lanc' was retired by the School of Maritime Reconnaissance at RAF St Mawgan, Cornwall on 15 October 1956. PB641 was on the strength of No. 210 Sqn at St Eval around 1951.

Stop-gap patrollers



Lancaster GR.Mk 3
RF325 was the last Lancaster in active RAF service. In GR/MR.Mk 3 form, the type served with Nos 120,160, 203 and 210 Sqns.

Neptune MR.Mk 1
WX505 flew with No. 217 Sqn at Kinloss. It was returned to the US Navy in 1957, after five years with the RAF.

In GR.Mk 6 form, the Halifax was another type to see out its last days in squadron service with Coastal Command. RG778, illustrated above, was typical of the aircraft serving with No. 224 Sqn, which flew its last operational sortie with the type from Gibraltar on 17 March 1952. The Halifax was not as important a type to Coastal Command as the Lancaster, although in the UK Halifax Mk 6s performed important meteorological work.

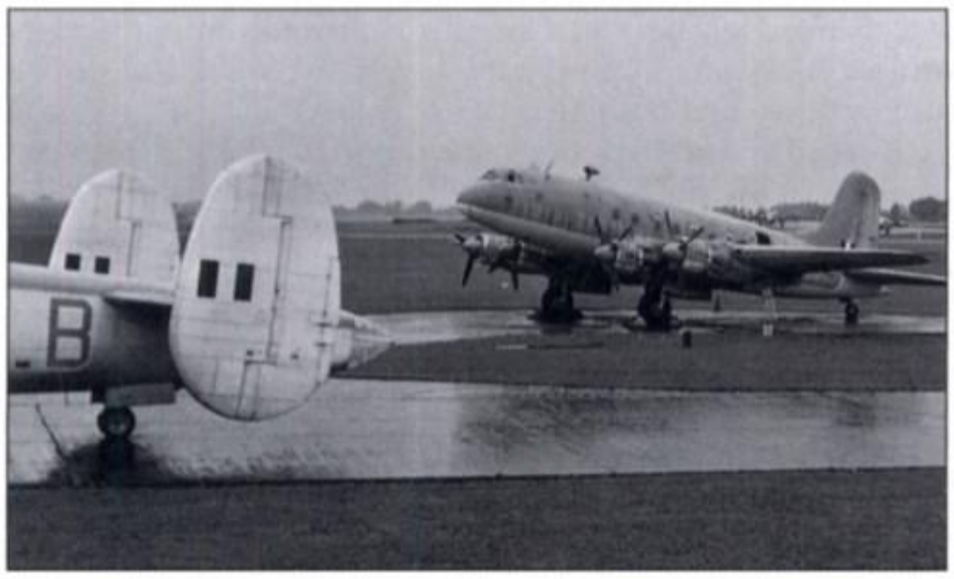
Right: Equivalent to the US Navy's P2V-5N, Coastal Command's Neptune MR.Mk 1s were delivered with the standard twin-20-mm cannon nose armament of the -5 variant, as here. This was subsequently replaced by a locally fitted Plexiglas nose, the RAF also adding a MAD boom in a long tail fairing. Seen here cruising on one engine, WX505 is a No. 217 Sqn aircraft based at RAF Topcliffe.

detection equipment; flying-boat crews then went on to No. 235 OCU at Calshot for a four-week conversion course on Short Sunderlands, which was expanded in December 1949 to a full flying-boat operational conversion course. Crews for the strike squadrons attended a 12-week course on Bristol Beaufighters at Kinloss, but this was discontinued in October 1947 when all maritime strike squadrons were disbanded in the interests of economy and the task assumed by Bomber Command. Squadrons at home and overseas pursued a regular training programme, and there were a number of overseas training 'cruises' to some extent perpetuating the pre-war practice.

It also proved possible from August 1947 to send a number of Coastal Command Lancasters to Ein Shemer in Palestine to reinforce their counterparts in the Mediterranean; the task was to locate ships carrying illegal immigrants to Palestine. Indeed, most of the more colourful activity involving RAF maritime aircrews occurred overseas during those years, particularly in the Far East: the *Amethyst* incident of 1949, when the frigate HMS *Amethyst* was shelled by the Communists on the Yangtze river during the Chinese civil war, the Malayan Emergency and the Korean War.

Meteorological reconnaissance

First priority for Coastal Command, however, was afforded to the meteorological reconnaissance flights over the North Atlantic, a commitment that survived until 1964, the Halifaxes being replaced by Handley Page Hastings in 1950. Regular reports on frontal weather systems approaching the British Isles were important for forecasting conditions over



the United Kingdom, Europe and the civil air routes across the Atlantic. The flights usually followed a triangular course, two legs being flown at some 1,500 ft (460 m) and a third at about 18,000 ft (5485 m). Measurements of temperature, wind, visibility and other atmospheric conditions were reported every 50 miles (80 km) and at pre-determined levels during the climb to and descent from altitude.

The sorties flown by the two photo-reconnaissance squadrons were designed to meet air survey requirements and to assist planning authorities in post-war reconstruction. In 1946 a survey of West Africa was started on behalf of the Colonial Office and by the time, four years later, that control of the Central Photographic Establishment was transferred to Bomber Command, photo-reconnaissance aircraft were operating over many parts of East and southern Africa.

In the longer term, Coastal Command's principal difficulties during the late 1940s concerned equipment. The elements of success in a maritime campaign had been unequivocally demonstrated in the Battle of the Atlantic: aircraft with adequate range for the tasks, efficient search and detection equipment, and effective weapons to destroy the target once detected. With the return of the wartime Consolidated Liberators, Boeing Fortresses and Consolidated Catalinas to the United States' and the retirement of the Vickers Warwicks and Vickers Wellingtons, the maritime force in the late 1940s came to depend on the Lancaster GR.Mk 3 and the Sunderland GR.Mk 5, the former being introduced as an interim general reconnaissance aircraft in 1946 and the latter having been in service in assorted versions since 1938.

The Lancaster had an endurance of 12 hours and a normal operating radius of action of some 950 miles (1529 km) with a warload of 7,000 lb (3175 kg), including 18 250-lb depth charges. In the search and shadowing role its endurance could be stretched to 16 hours and its normal operating radius to 1,300 miles (2092 km) by replacing the depth charges with overload fuel tanks. The Sunderland, loaded with 16 250-lb depth charges, had an endurance of 11 hours and a normal operating radius of action of 625 miles (1006 km); without its depth charges its endurance in the search and shadowing mode were increased to almost 16 hours and its radius of action to 900 miles (1448 km). Both types of aircraft thus had a significantly shorter radius of action than the very long-range of the wartime Liberators and Catalinas.

Both the Lancaster and the Sunderland were equipped with the air-to-surface vessel (ASV) radar which at a normal operating height of 1,000 ft (305 m) could detect a snorkelling submarine in a reasonably calm sea at about 5 miles (8 km), and a 10,000-ton vessel at between 25 and 30 miles (40 to 48 km). Both aircraft also carried sonobuoys, which had become available in the later stages of the war, but only in limited numbers; they were, however, to have a profound influence on the post-war development of anti-submarine warfare. When dropped into the sea, the early non-directional buoy could detect the sound of a submarine's turning propellers by means of a hydrophone and transmit it back to the aircraft; by comparing the signal strengths received from different buoys, whose relative positions were known, an operator in the aircraft could determine the submarine's course and speed. A more advanced type, the directional sonobuoy, not introduced until the early 1950s, could indicate the submarine's bearing from the buoy. For search and detection, therefore, Coastal Command was little better equipped in the late 1940s than it had been in wartime.

In weaponry, however, the same could not be said. The command's main weapon against an enemy submarine in the immediate post-war years was the depth charge. Its lethal range was only some 19 ft (5.80 m), and to stand a reasonable chance of success an attack had to be made within 30 seconds of the target submerging. More effective was the American torpedo or Mk XXIV mine, carried by some of the very long-range Liberators and designed to home on to a submarine making a noise, but the remaining stocks of these were returned to the United States after the war. The 600-lb anti-submarine bomb, which had been used occasionally in the war mainly against surfaced submarines, had also been withdrawn from use. As a result, until a new homing torpedo became available in the 1950s, the command was in a considerably worse position than it had been in the latter phases of the war.

Replacements needed

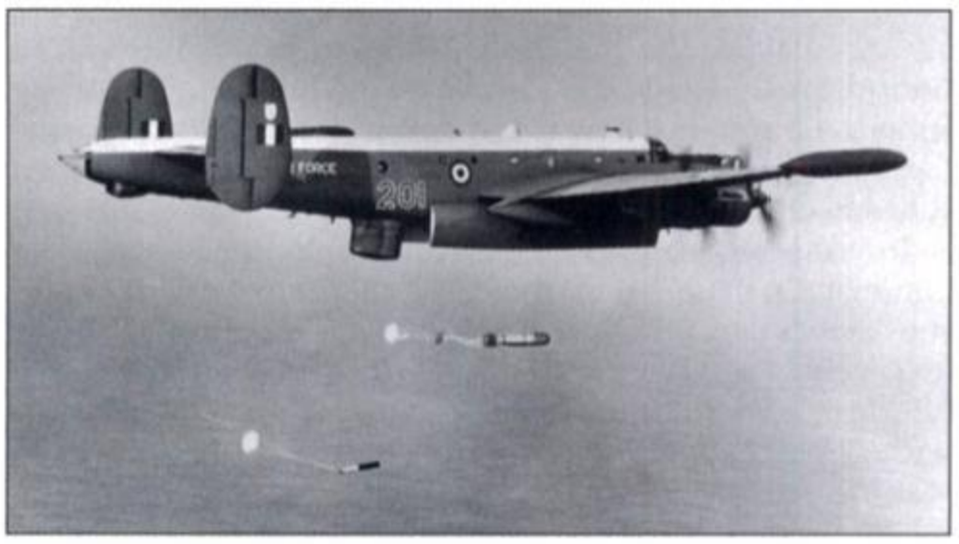
Thus, when it became evident in 1950 that the Soviet Union was engaged in a rapid expansion of its naval forces and was conceivably preparing to have 1,000 submarines in service by the early 1950s, it was not simply a matter of increasing Coastal Command's front-line strength in concert with Britain's naval forces. What was required was a replacement for the Sunderland and Lancaster, with a better radius of action and a British version of the homing torpedo. Proposals for a new medium-range flying-boat

Above: The differences between the Shackleton MR.Mk 1 (foreground) and MR.Mk 2 are readily apparent here. Mating the Lincoln's wings and undercarriage to an all-new fuselage and engines, the MR.Mk 1 prototype first flew on 9 March 1949. With the Shackleton Coastal Command was able to not only replace the venerable Lancaster GR.Mk 3, but to also equip new squadrons as the Command expanded. The Shackleton MR.Mk 2 entered service from 1953 and introduced cannon nose armament and an ASV radar set relocated to a retractable 'dustbin' radome beneath the rear fuselage.

Above left: Little known in Coastal Command service, the Handley Page Hastings took over the meteorological reconnaissance task from the Halifax in October 1950. No. 202 Sqn flew the Hastings Met.Mk 1 from Aldergrove on long, and often dangerous, sorties in all weathers in order to provide data for weather forecasting. Operations were finally discontinued in July 1964.

As well as keeping home waters free of Soviet penetration, the Command also took part in a number of important long-range flag-waving flights. One such expedition saw No. 228 Sqn take four Shackleton MR.Mk 2s – seen here – on a tour of Brazil, Colombia and Venezuela in 1955.

came to nothing, although the Short Seaford (originally the Sunderland Mk IV) underwent operational trials with No. 201 Squadron in 1946 before being withdrawn as a victim of the defence cutback. Plans had also been laid as early as March 1946 for a new long-range, land-based maritime reconnaissance aircraft based on the Avro Lincoln bomber and capable of operating in any part of the world with a 6,000-lb weapon load and a normal operating radius of action of 1,725 miles (2776 km). In a revised specification the weapon load was reduced to 4,000 lb (1814 kg) and the radius of action agreed at 1,500 miles (2414 km). The resulting aircraft, the Avro Shackleton, was introduced into service in 1951 and soon settled down to become the RAF's maritime mainstay for the next two decades. It could carry a crew of 10, including two pilots, two navigators, an engineer and five signallers. Its introduction led to many changes in Coastal Command's infrastructure: runways, hardstandings and servicing areas had to be strengthened and training facilities extended.



In an unusual display of its weapons systems capability, a Shackleton MR.Mk 3 deploys both a Mk 30 torpedo and a sonobuoy on a single pass. With the MR.Mk 3 came the introduction of ASV Mk 21 radar, wing tip fuel tanks and tricycle undercarriage. The Mk 3 fleet was progressively modified; a number of Phase III aircraft were fitted with a Rolls-Royce Viper turbojet engine in each inner engine nacelle to improve take-off performance. The aircraft illustrated hailed from No. 201 Sqn, which received Mk 3s in October 1958, the type having entered service initially with No. 220 Sqn at St Eval in December 1957.

Right: Missions of long duration were the name of the Shackleton's game. For the 1960 SBAC air display No. 201 Sqn demonstrated the new MR.Mk 3's endurance by commencing a 24-hour sortie from Farnborough each day.

Adequate numbers of Shackletons would not become available in the early 1950s to meet the command's increasing commitments and its new responsibilities within the NATO alliance. A stopgap was sought and found in the American-built Lockheed P2V-5 Neptune, of which 52 (sufficient to equip four squadrons) were supplied by the United States under the Mutual Defence Assistance Program. With a radius of action of 1,275 miles (2052 km) and a weapon load of 2,700 lb (1225 kg), the Neptune was an effective aircraft whose real strength lay in its powerful APS-20 search and APS-31 attack radars, its search receiver (which intercepted radar transmissions from enemy vessels), and wing-mounted searchlight for night-time illumination of targets. However, an acute shortage of spares led to problems which had not been fully resolved when the Neptune started being withdrawn in August 1956 after only four years in service.

Expansion complete

By July 1954 Coastal Command's expansion programme was complete. The command now had a front-line strength of nine Shackleton squadrons, four of Neptunes and two of Sunderlands in the maritime role, plus one Hastings squadron performing the meteorological reconnaissance task. In all, the Command comprised a force of 119 aircraft (eight on Shackleton and Neptune squadrons, and five on Sunderland and Hastings squadrons). Shackletons and Sunderlands were based on the western seaboard to cover the eastern Atlantic, and the Neptunes at Kinloss and Topcliffe to cover enemy submarines and surface ships using northern waters and the North Sea.

Shortly after the completion of its expansion programme, Coastal Command started to receive the Mk 30 homing torpedo which, with the introduction of the directional sonobuoy, gave its maritime aircraft much improved tracking and attack capabilities. There remained the problem of making the initial detection. Improvements in this area came with the introduction of a device (the 'sniffer') which could detect a submarine's diesel exhaust gases, and of a British airborne search receiver that brought the Shackleton up to the standard of the Neptune in this respect.

By 1955, therefore, Coastal Command had been largely transformed. Nor was it acting alone, as it was now part of the NATO alliance's forces. Its aircraft had been earmarked for SACLANT (the NATO Supreme Commander, Atlantic) since 1952, and its commander-in-chief commanded jointly with his British naval opposite number all NATO forces in the eastern Atlantic, one of the two areas into which the Atlantic as a whole had been divided for operational purposes. Together the two commanders were to be responsible in time of war for maintaining the

A noisy place to work
For the aircrew who sat in line with the inboard sets of propellers, the Shackleton was one of the noisiest aircraft in which to fly. This made the long endurance missions that the aircraft was designed to fly especially gruelling.

Rear fuselage cupolas
A pair of cupolas could be extended from beneath the tail for photo-reconnaissance. The forward cupola contained an F24 day camera and F97 night-time camera, both for oblique photography. The rear cupola carried an F24 for vertical photography. Photoflashes were employed to facilitate night photography.

Cannon armament
In its early form, the MR.Mk 2 carried four 20-mm cannon, two in the nose and a further pair in a dorsal turret. The nose guns could be used defensively, but were also of considerable use against surface targets. The weapons were Hispano Mk 5 guns, those in the nose traversing through 50° in depression, 5° in elevation and up to 20° to port and starboard.

Fuel capacity
Most of the space between the fuselage and wingtips was filled with four fuel tanks, positioned between the spars of each wing. Total capacity was 3,292 Imp gal (14965 litres) and this could be supplemented by a bomb bay fuel tank and, in the MR.Mk 3, tip tanks.

Colour scheme
This aircraft is depicted in a typical 1950's Shackleton finish. All top surfaces are in Medium Sea Grey, with matt white vertical tail surfaces and fuselage sides, and gloss white fuselage undersides. A 1954 suggestion from No. 236 OCU led to the adoption of overall gloss Extra Dark Sea Grey. The latter was thought to be a more effective colour for camouflage over the sea, while it was easier to clean salt and other deposits from a gloss-finished airframe.

Griffon power
Each of the Shackleton MR.Mk 2's 13-ft (3.96-m) diameter, six-bladed de Havilland propellers was driven by a 1,740-hp (1298-kW) Rolls-Royce Griffon 57A engine. Power output on take off could be increased to 2,435 hp (1816 kW) by means of water-methanol injection.

'Dustbin' radome
At the heart of the MR.Mk 2's detection systems was an ASV Mk 13 radar unit, housed in a retractable ventral 'dustbin' radome. In the head-on view here, the radome is shown extended for reasons of illustration, this was clearly not a standard configuration for an aircraft standing on its undercarriage on the ground.

Heath Fretwell

WG557 was first flown after completion on 5 November 1952 and issued to No. 206 Sqn at St. Eval the following February, where it was coded 'B-Z'. '557 spent its entire front-line service career at St. Eval, transferring to No. 220 Sqn (as 'T-L') in March 1954 and No. 228 Sqn (as 'L-L', depicted here) in September. After a period in storage beginning in 1956, the aircraft completed spells with the RAE's Armament Flight and the ETPS before being struck off charge in 1964.

Avro Shackleton MR.Mk 2
No. 228 Sqn, RAF St. Eval, 1955

Above: When the Nimrod MR.Mk 1 entered service in 1969, the RAF acquired what was, and indeed remains, arguably the world's most capable airborne ASW/MR platform. From 1980, Strike Command began to receive the vastly more capable MR.Mk 2, which coincided with a change in colour scheme to a Hemp and Light Aircraft Grey finish.

Right: With the discovery of oil and gas reserves in the North Sea, the UK suddenly found itself with a new, immensly valuable and hugely vulnerable industry. No. 27 Sqn used its Vulcan B.Mk 2MRRs in a radar and maritime reconnaissance capacity in order to protect the North Sea rigs.

Below: With the Buccaneer, the RAF gained a serious anti-ship striker. This aircraft carries both the anti-radar and TV-guided variants of its principal weapon – the AJ 168 Martel AShM.

Atlantic lifeline, emphasis being placed upon convoy protection, anti-submarine measures and a highly mobile striking fleet; in peacetime they would concentrate on the development of new tactical concepts and devising the frequent joint exercises which were to weld the various air and naval forces involved into an effective fighting force.

Meanwhile Coastal Command was also engaged in numerous other activities around the world, which provided experience in the kind of instant deployment that might be required if a threat developed outside the NATO theatre. Overseas training flights continued: aircraft were sent to Malta for anti-submarine training, and maritime aircraft were often employed as transports, supporting the British North Greenland Expedition in 1951-54 for example, or ferrying supplies to the Ionian Islands after an earthquake. Later, between 1956 and 1958, Coastal Command aircraft provided search and rescue cover during the Monte Bello, Maralinga and Christmas Island tests of the British atomic weapons; they also carried out meteorological reconnaissance sorties during the tests and maintained ocean patrols to keep shipping from straying into the danger zones. The Shackleton was in fact proving to be a highly versatile aircraft with a very wide range of capabilities.

A new approach to a traditional task began late in 1955 with the formation at Thorney Island of No. 22 Squadron with six Westland Whirlwind helicopters for search and rescue work. Detachments were later provided at Martlesham Heath and Valley to cover the RAF training areas, and in due course most of the busier coastal waters around the United Kingdom came within the scope of the search and rescue helicopters.

Neptunes no more

The chill wind of contraction which started to blow through the RAF in the later 1950s was tempered to some extent for Coastal Command by the government's acceptance of the thesis that Soviet naval expansion constituted a particular threat to Britain. All the same, the four Neptune squadrons were disbanded between August 1956 and March 1957, and the two Sunderland squadrons early in 1957. Thoughts of ordering the Short Seamew for the short-range anti-submarine reconnaissance role, and of using helicopters for inshore operations, were abandoned, and even the order for the Mk 3 version of the Shackleton (with tricycle landing gear and auxiliary wingtip fuel tanks) was reduced. The first squadrons to take delivery of the last, No. 220 in September 1957 and No. 206 in January 1958, were given only six aircraft instead of the previous establishment of eight. However, a programme of progressive improvement of the Shackleton's radar equipment was started, and the Mk XXI ASV radar was introduced together with a new sonobuoy and improved tracking and navigation equipment.

The 1960s witnessed two fresh problems: the appearance of the nuclear submarine and the development by the Soviet

navy of a greatly enhanced ocean-going capability. The qualities of the nuclear submarine (its greater underwater speed and its ability to travel vast distances without surfacing and to operate at much greater depths) rendered anti-submarine operations considerably more complex. Moreover, the rapid growth of the Soviet Union's ocean-going fleet, including nuclear submarines armed with intercontinental ballistic missiles, forced a shift of emphasis upon Coastal Command. As well as protecting convoys in the Western Approaches and the English Channel, and supporting NATO's strike fleet, it now had the additional task of maintaining an air screen to detect and monitor Russian ships and submarines moving down through the Norwegian Sea into the Atlantic.

To match this shift of emphasis, Coastal Command, had by 1965, three of its eight Shackleton squadrons based at Ballykelly, three at Kinloss, one at St Mawgan and one in Gibraltar, all with six aircraft apiece. This deployment represented a movement of the centre of gravity from the south west towards the north and north west, now the main areas of Soviet activity.

The Shackletons were beginning to show signs of their age and were kept in service throughout the 1960s only by a rolling programme of modernisation that included a steady improvement in their weapons capability, introduction of jet-assisted take-off and progressive updating of their radar, navigation and ECM equipment.

Replacing the Shackleton

Meanwhile the search for a Shackleton replacement had run into difficulties, resulting principally from enforced contraction of the British aircraft industry as well as the perennial demands for reductions in defence expenditure. Nevertheless the resulting Hawker Siddeley Nimrod, an extensively modified adaptation of the Comet airliner, matched the demands of the original specification, namely a high transit speed to the patrol area some 1,000 miles (1609 km) from base, and the ability to remain on patrol for at least four hours while carrying a substantial weapon load, including a nuclear option in the shape of US-owned B57 depth charges.

The new aircraft was introduced into squadron service in the latter half of 1970 and early 1971. By then the maritime front-line strength had been reduced to no more than four squadrons, each with six aircraft: Nos 120, 201 and 206 Squadrons at Kinloss and No. 42 at St Mawgan; some would consider this a logical extension of the previous deployment concept which sought to concentrate the greater weight of forces in the north, and it is generally accepted that the drastic reduction in numbers of aircraft was partly offset by the Nimrod's greatly improved operating capability. On the other hand the maritime task had meanwhile increased in the mid-1970s by the need to afford protection to the growing number of offshore gas and oil installations in the northern waters.

The demise of Coastal Command

No. 1 (Bomber) Group began making a major contribution to the maritime task in October 1969, when No. 12 Squadron re-formed at Honington, with Blackburn Buccaneer S.Mk 2As for the maritime strike/attack task, moving to Lossiemouth with S.Mk 2Bs in 1980. Additional long-range maritime reconnaissance was provided by the Victor B.Mk 2s of No. 543 Squadron, also in No. 1 Group, until May 1974 when the task was assumed by the Vulcans of the newly re-formed No. 27 Squadron.

In terms of organisation Coastal Command, which had originally formed under the title of Coastal Area in 1919, disappeared 50 years later in November 1969, being replaced by No. 18 Group, a component of the new Strike Command, while its former subordinate groups, Nos 18 and 19, became the Northern and Southern Maritime Air Regions respectively.

As well as the Nimrods, the front-line maritime force in December 1975 also boasted two search-and-rescue helicopter squadrons: No. 22 Squadron at Thorney Island with Whirlwinds (to which the Westland Wessex was added in 1976), and No. 202, formed at Leconfield in 1964 with Whirlwinds. The infinitely more capable Westland Sea King joined No. 202 Sqn in 1978.

With the Nimrod having replaced the MR Shackleton in the all-important ASW/maritime-recce role by early 1972, the final Shackletons were tasked only with maintaining SAR standby. This last duty was assumed by the Nimrod from April 1972, the new type working closely with the Sea King HAR.Mk 3 and Wessex HAR.Mk 2 SAR helicopters. These three aircraft types, plus the Buccaneer and Vulcan B.Mk 2MRR constituted the equipment of No. 18 Group into 1982, when major events would again grip the RAF's maritime forces. Not only were the MRR Vulcans retired on 31 March, but the RAF was given the opportunity to flex its maritime muscles while stretching them to their limits during the Falklands conflict.

With the Whirlwind HAR.Mk 10's introduction into service in August 1962, the RAF was introduced to turbine-engined SAR helicopter operations. 'C' Flight of No. 22 Sqn received the RAF's first Wessex HAR.Mk 2 (illustrated) aircraft in May 1976.

In 1978 the Sea King HAR.Mk 3 entered service. The aircraft boasted a radius of action in the region of 270 miles (435 km), which compared favourably with the 95 miles (153 km) of the Wessex HAR.Mk 2 and 85 miles (137 km) of the Whirlwind HAR.Mk 10.

Unit Heritage

51° Stormo
'Ferruccio Serafini'

51° Stormo is dedicated to the memory of Sergente Pilota Ferruccio Serafini, a courageous 23-year-old pilot who sacrificed his life over Maschiareddu, near Cagliari, on 22 July 1943. Serafini took off with his Macchi MC.205 Veltro to intercept 48 Curtiss P-40Fs of the 325th Fighter Group, USAAF. Soon after the opposing forces had engaged, Serafini's Macchi MC.205 – after shooting down one of the P-40Fs – ran out of ammunition. After an impressive series of manoeuvres between numerous enemy fighters, Serafini deliberately flew his Veltro into one of the American fighters, both aircraft crashing near the Elmas saltworks. During 1967, when 51ª Aerobrigata again became 51° Stormo, it was assigned the Ferruccio Serafini name to honour him.

By disposition of the Stato Maggiore della Regia Aeronautica, Foglio d'Ordini n. 029/2 dated 25 September 1939, the 51° Stormo Caccia Terrestre was officially constituted on 1 October 1939 at the Ciampino Sud airport near Rome. The new unit was placed under the control of the 3 ZAT (Zona Aerea Territoriale), which included the Lazio and Tuscany areas.

The new Stormo was formed with two Gruppi and six Squadriglie: the 20° Gruppo CT

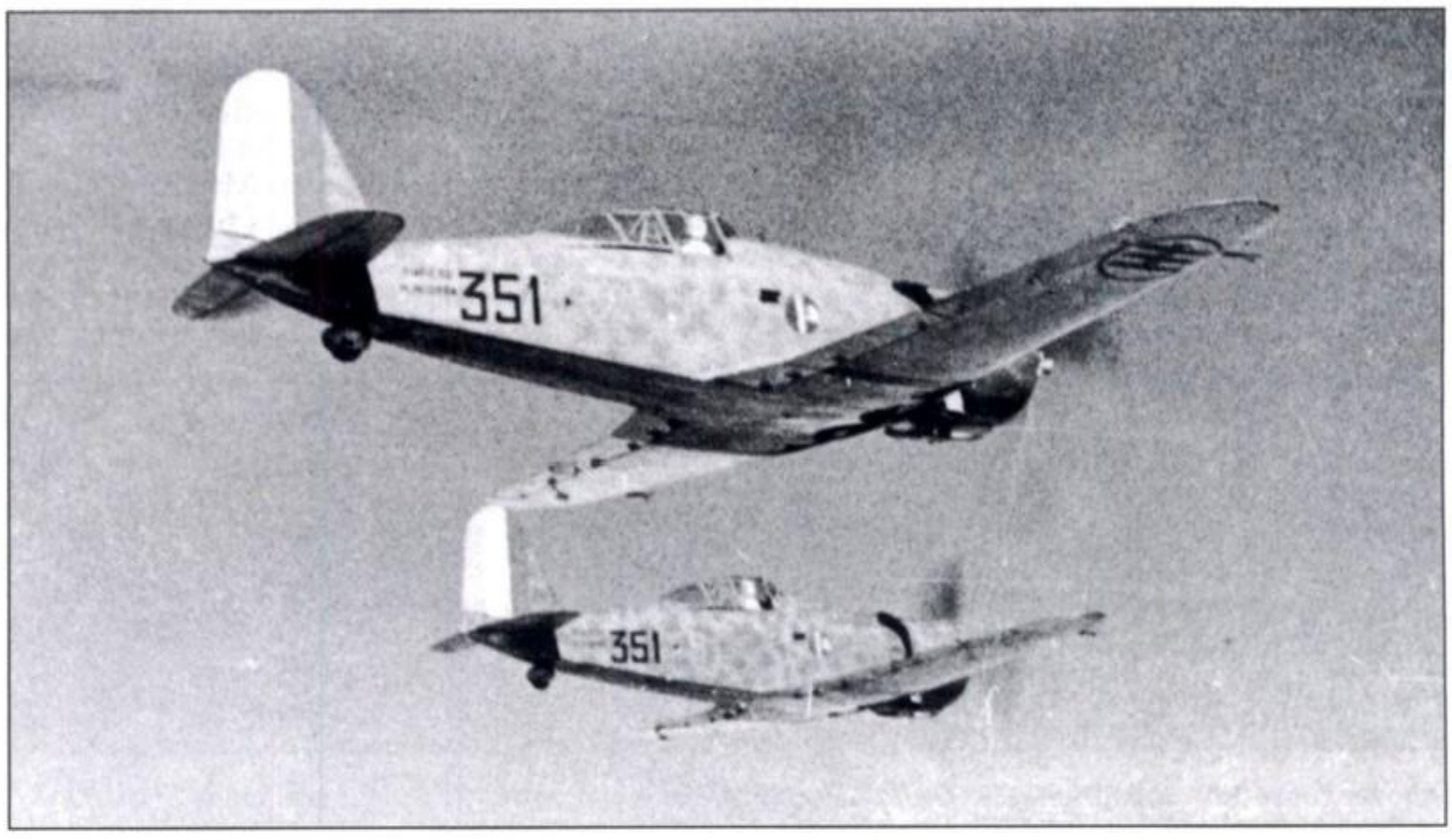
Over 50 years separate 51° Stormo's Macchi MC.205s (exemplified by MM3511 of 351ª Squadriglia, at Monserrato in 1943, below) and its present mount, the AMX (above).

The 'Sorci Verdi' of 51° Stormo

The famous badge of the 51° Stormo – a black cat that has killed three green mice – was a result of a lively argument that developed between proponents of bombers and fighters. The former supported the bombers' capability of self-defence; the latter supported the fighters' ability to deny the bomber mission. During the four years preceding the outbreak of World War II, it seemed that the bomber supporters were right. At that time, fighter and bomber aircraft had completely different characteristics. Fighter squadrons were not able to counter bomber squadrons equipped with the SIAI Marchetti S.79, for this new bomber – which had achieved international recognition with the 'Sorci Verdi' (Green Mice) unit – was faster than the Fiat CR.32 assigned to the fighter units. During one attack exercise against Rome, the defence of the capital was entrusted not only to the CR.32-equipped squadron but also to the new Fiat G.50 that recently had been assigned to the 351ª Squadriglia of the 51° Stormo. The new fighter's performance was so much better than that of previous aircraft that it was able to prevent the bombers overflying Rome.

When the Fiat G.50 pilots returned to their base, the crews of 51° Stormo were delighted, and a pilot exclaimed, "Finally, the green mice have met the cat!" One young pilot, Ten.Pil. Vincenzo Sant'Andrea, sketched on the tailfin of his aircraft a picture of a black cat killing three green mice, which represented the S.79 bombers. Everybody at the 51° Stormo approved of the image, but the Stato Maggiore was not as happy, feeling that the new emblem was too offensive to the prestigious 'Sorci Verdi' crews. It was decided to keep the image but change the colours of the mice to grey. After the 51° Stormo disbanded in autumn 1940, the emblem was retained by the 20° Gruppo CT. During World War II when the unit, with the 56° Stormo CT, moved to Belgium to support CAI (Corpo Aereo Italiano) operations over Great Britain, the 20° Gruppo repainted the emblem with green mice, officially because the colour green stood for 'hope': hope for good luck, and to finish the war.

Today, 60 years later, the emblem is the same and now adorns the tails of the Alenia AMXs of the two flying groups of the 51° Stormo.



Above: This Fiat CR.32 served with the 356ª Squadriglia, 21° Gruppo CT (Caccia Terrestre, land-based fighter) in 1939. The Squadriglia operated as a night-fighter unit during mid-1940.

Right: The first equipment of 51° Stormo was the Fiat G.50 Freccia. Both aircraft display their Squadriglia number on the fuselage side – this pair being from 351ª Squadriglia, part of the 20° Gruppo CT. The nearest aircraft is MM3984.

with the 351ª, 352ª and 353ª Squadriglie, and the 21° Gruppo CT with the 354ª, 355ª and 356ª Squadriglie. The first commander of the 51° Stormo was Ten.Col. Pilota Umberto Chiesa, and the two groups were commanded by Maj. Bonzano and Maj. Mezzetti. The 51° Stormo was initially equipped with the Fiat G.50 Freccia and tasked with protecting the airspace of Rome and Naples.

After a night raid over Rome by a French aircraft, a Farman NC 223.4, the Superaereo decided to form a night section equipped with Fiat CR.32s. Its first mission was on the night of 13 June 1940, but no enemy aircraft were detected.

Landing at Guidonia air base after the night mission on 14 June was a nightmare for the three CR.32 pilots, Ten. Cugnasca, the section commander, and Sten. Cobolli-Gigli and Serg. Casini. They had difficulty finding the base and only Ten. Cugnasca was able to find the landing strip. Sten. Cobolli parachuted from his CR.32, which was out of fuel, and Serg. Casini hit a power line while flying at very low level. Luckily, all the pilots survived, the only injury being Serg. Casini's broken leg.

On 16 June the 51° Stormo registered its first loss, when Serg. Loris Malagoli crashed near the Vigna di Valle seaplane base due to bad weather.

The situation remained unchanged until 18

Below: Ground crew rearm a 353ª Squadriglia, 20° Gruppo CT Fiat G.50Bis at Maldegem, Belgium, when the unit was part of the Corpo Aereo Italiano – the expeditionary force against the UK, formed on 10 September 1940.

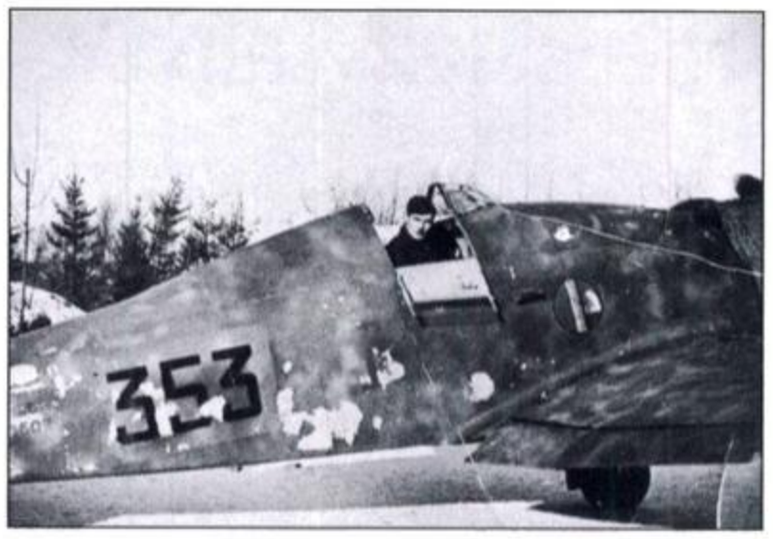
These 353° Squadriglia's Fiat G.50bis aircraft are seen lined up at Ciampino airport in 1940 prior to joining the CAI.

Groundcrew swarm around a pair of Fiat CR.42CN Falcos of the 356ª Squadriglia Caccia Notturna, based at Capodichino in 1941. Note that the aircraft nearest the camera carries a searchlight under its port wing.

September, when the 20° Gruppo was moved to form the new 56° Stormo CT. On 27 September the 21° Gruppo was incorporated as the 52° Stormo. Consequently, the Stato Maggiore decided to disband the 51° Stormo.

On 1 January 1942 the 51° Stormo was officially reformed at the Ciampino Sud air base and placed under the command of Col. Aldo Remodino. The Gruppi assigned were the 20° (151ª, 352ª and 353ª Squadriglie) and the 155° (351ª, 360ª and 378ª Squadriglie), equipped with 22 Fiat G.50 Freccias and 32 Macchi MC.200 Saettas. The 300ª Squadriglia Caccia Notturna, equipped with Caproni Vizzola F.5s and Fiat CR.42s, was also under the control of the 51° Stormo until 15 May of that year, when it joined the 167° Gruppo Autonomo Caccia Intercettori.

The new Macchi MC.200 and the Fiat G.50 were probably not the best aircraft for young Italian fighters pilots coming from the former Gruppo Complementare of the disbanded 52° Stormo. The unit's tasking was to protect the airspace of Naples, and until March 1942 nothing of note happened. On 24 March, the 51° Stormo received its first Macchi MC.202 Folgores, surely one of the best fighters built by Italian industry. It had excellent flight characteristics and a high turn rate, but, in common with other Italian-built fighters, had insufficient firepower, being equipped with only two 12.7-mm machine-guns.



A battered G.50bis (MM3602) of 353ª Squadriglia sits in the snow, probably in Belgium. The fascio emblem in front of the cockpit, common to all Italian-built military aircraft of the period, is a blue disc, brown (wooden) shaft and silver blade.

On 12 April 1942 the Stormo officially received war orders. After converting to the MC.202, the 51° moved to Gela, Sicily to participate in activities in the Malta and Central Mediterranean Sea sectors. Its first war action came on 2 June 1942, when 20 Macchi MC.202s of the 155° Gruppo, commanded by Maj. Fanali and escorting a formation of S.84 bombers, engaged a formation of British Spitfires. At the end of the dogfight, Cap. Miani had shot down one Spitfire, marking the first aerial victory of the 51° Stormo. There followed a few months of close engagement with the British fighters, during which many Italian pilots were lost.

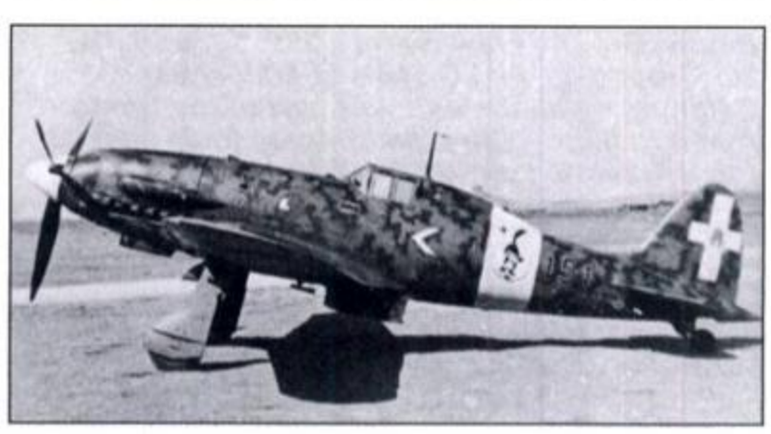
During the Allied invasion of Algeria, the 155° Gruppo moved to El Alouina airfield on 11 November 1942, while the 20° Gruppo moved to Castelvetrano, Sicily. The aerial war had been very hard on the two groups, and the pilots now had to fight with limited serviceable aircraft and a very poor infrastructure. Dogfights with Spitfires, P-40s and P-38s proceeded furiously, combined with strafing and bomber escort missions.

At the end of 1942 it was evident that the Stormo could no longer meet the demands of the war, and on 11 December the few aircraft remaining (10 from the 155° Gruppo and four from the 20° Gruppo) returned to Gela, where they remained for some weeks before moving to Ciampino. In six months of war, the pilots of the 51° Stormo had flown more than 6,000 hours; made 1,100 combat missions and 109

Above: These 151ª Squadriglia, 20° Gruppo Fiat G.50s have evidently suffered at the hands of the Allies, in the Western Desert during 1942. The left-hand aircraft carries the 51° Stormo emblem on its tail.

Above: Despite a heavy, complex structure, the Macchi MC.202 Folgore (Thunderbolt) is widely regarded as the best Italian fighter of World War II. This example belongs to 378ª Squadriglia of 155° Gruppo CT.

Above: This Macchi MC.202 of 353ª Squadriglia, 20° Gruppo CT, was photographed towards the end of 1942, sitting at Ciampinio Sud airport. By this time the Stormo was having difficulty in maintaining its MC.202s.



Above: The white chevron on the fuselage and the individual aircraft number '1' indicate that this 151ª Squadriglia MC.202 was a unit commander's aircraft. The unit's 'Sorci Verdi' insignia was applied over a white fuselage band.

Folgore camouflage schemes differed considerably between units, as illustrated by these 351ª and 151ª Squadriglia examples.

aerial engagements; shot down 106 enemy aircraft, with some 53 probably destroyed; and lost 27 aircraft, 20 pilots and four technicians, including the heroic 151ª Squadriglia commander, Cap. Furio Niclot Doglio.

In March 1943, back at Ciampino Sud, the pilots of the 51° Stormo were again flying the air defence mission of the airspace of Rome and Naples, defending the two cities from heavy Allied bomber raids. Often, the small numbers of Macchi 202s of the two groups faced more than 100 enemy bombers, escorted by formations of Spitfires, Mustangs or Lightnings. The few Folgores in service were insufficient in both number and firepower to meet the demands of air defence.

In April 1943 the 51° Stormo began to re-equip with the new Macchi MC.205 Veltro, an improved version of the Folgore armed with the two 12.7-mm machine-guns plus two wing-mounted 20-mm guns. The Veltro was fast and heavily armed, but less manoeuvrable than the Folgore. After a brief training period on the new aircraft, Col. Remondino, the 51° Stormo commander, received orders to deploy the 20° Gruppo to Capoterra airfield and the 155° Gruppo to Monserrato airfield, both near Cagliari, in Sardinia. In this theatre, the two groups of the 51° Stormo were heavily involved

Macchi MC.202s of 360ª and 351ª Squadriglia of the 155° Gruppo CT are seen, between missions, on an unidentified airfield, probably in North Africa during 1942. The marking on the undercarriage door of the nearest Folgore was peculiar to 360ª Squadriglia aircraft. As well as Folgores, SIAI-Marchetti SM.79s, Fiat CR.42s and Macchi MC.200s (centre) are visible.

51° Stormo fighters

CAI Fiat G.50 Freccia
With a yellow cowling but lacking the white fuselage band (adopted in late 1940/early 1941), this Freccia was on the strength of 20° Gruppo CT, 51° Stormo, as part of the Corpo Aereo Italiano. 20° Gruppo served as part of the CAI between October 1940 and March 1941 when it returned to Ciampino in Italy, before going on to fight in the Western Desert. Generally outclassed as a fighter by late 1940, the Freccias was replaced by the Macchi MC.202 in 51° and other fighter Stormos.

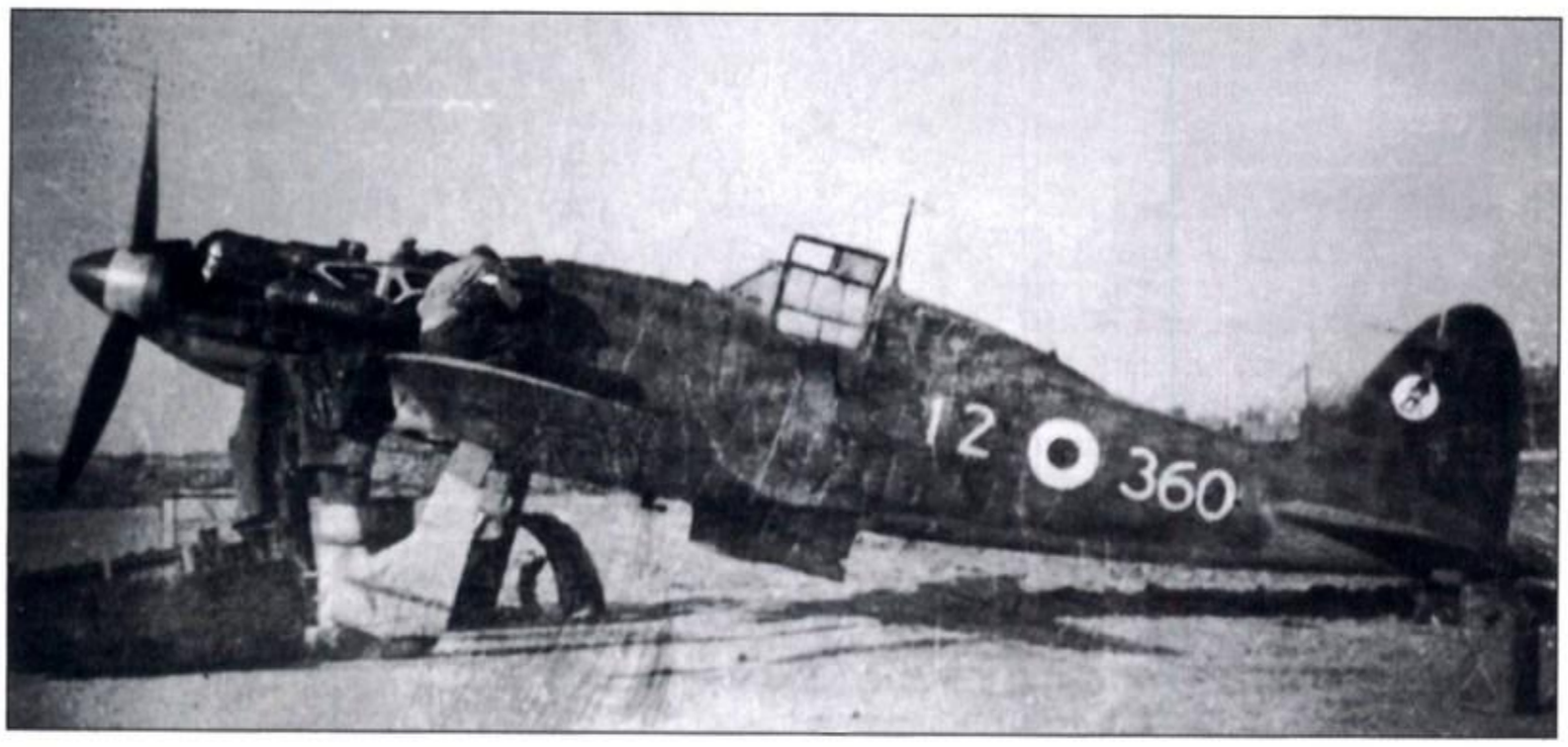
Regia Aeronautica Veltro
Macchi MC.205V Veltro Serie I '3' (MM9347) of 351ª Squadriglia, 155° Gruppo CT, 51° Stormo, was based at Monserrato during June 1943. The unit had received 12 of the type by May, but with poor fuel quality and the aircraft's excessive oil consumption, no radio, and hydraulic, pneumatic and electrical systems that were prone to failure, the Veltros were constantly subject to factory modification.

Co-belligerent Veltro
Based at Lecce-Galatina in 1944, this MC.205V Veltro was also, operated by 155° Gruppo CT, 51° Stormo, but as part of the Allied co-belligerent air force. 155° Gruppo CT had four MC.202s and eight MC.205Vs operational on 7 September 1943, the day before the Italians signed an armistice with the Allies. Compared to the aircraft above, the Fascist roundels have been replaced by the modern roundels, and fuselage Squadriglia codes have been replaced by tail mounted Gruppo-based codes.

Unit Heritage

Right: Lacking unit badges of any description, this Fiat G.55 Centauro Serie I (MM91059) belongs to 353ª Squadriglia, 20° Gruppo CT. It was photographed in August 1943.

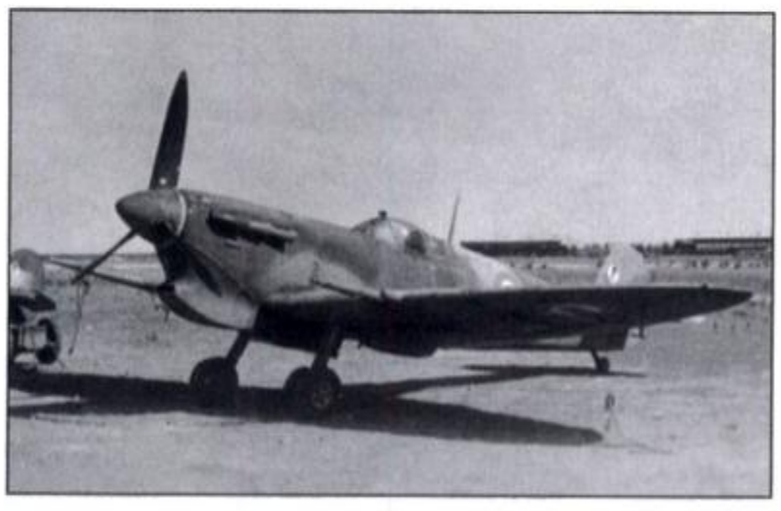
Below: Though of poor quality, this view of a Macchi MC.205 is of interest as it shows an aircraft of 360ª Squadriglia, 20° Gruppo CT, of the Italian co-belligerent air force, around mid-1944. Note the arrow emblem on the lower portion of the undercarriage door and the red and white spinner, plus 51° Stormo's badge on the tail.



in escort operations over Sicily and the Mediterranean Sea. Many pilots were lost in these operations, and several won honour medals: Cap. D'Amico, Ten. Paolo Damiani, Mllo. Pietro Bianchi and Serg.Pil. Ferruccio Serafini were awarded the Gold Medal of Honour.

By August, few aircraft remained available for the 51° to fly. From the day of its arrival in Sardinia, the Stormo had received no aircraft to replace the lost Veltros and, more importantly, no new pilots had been assigned. On 23 August the 20° Gruppo was transferred to Foligno, to re-equip with the Fiat G.55 Centauro; the 155° Gruppo remained in Sardinia at two bases, Casa Zeppera and Milis.

At the time of the armistice on 8 September 1943, the 20° Gruppo was in the process of transitioning to the Fiat G.55 Centauro. The new aircraft was probably the best fighter built in Italy during the war, being powerful, manoeuvrable and armed with four 12.7-mm machine-guns and a 20-mm gun. Unfortunately, due to chronic disorganisation and a lack of both vital construction material and spare parts, by the time the units received the new type it was too late to be of much use. At armistice, the 20° Gruppo had no flyable aircraft.

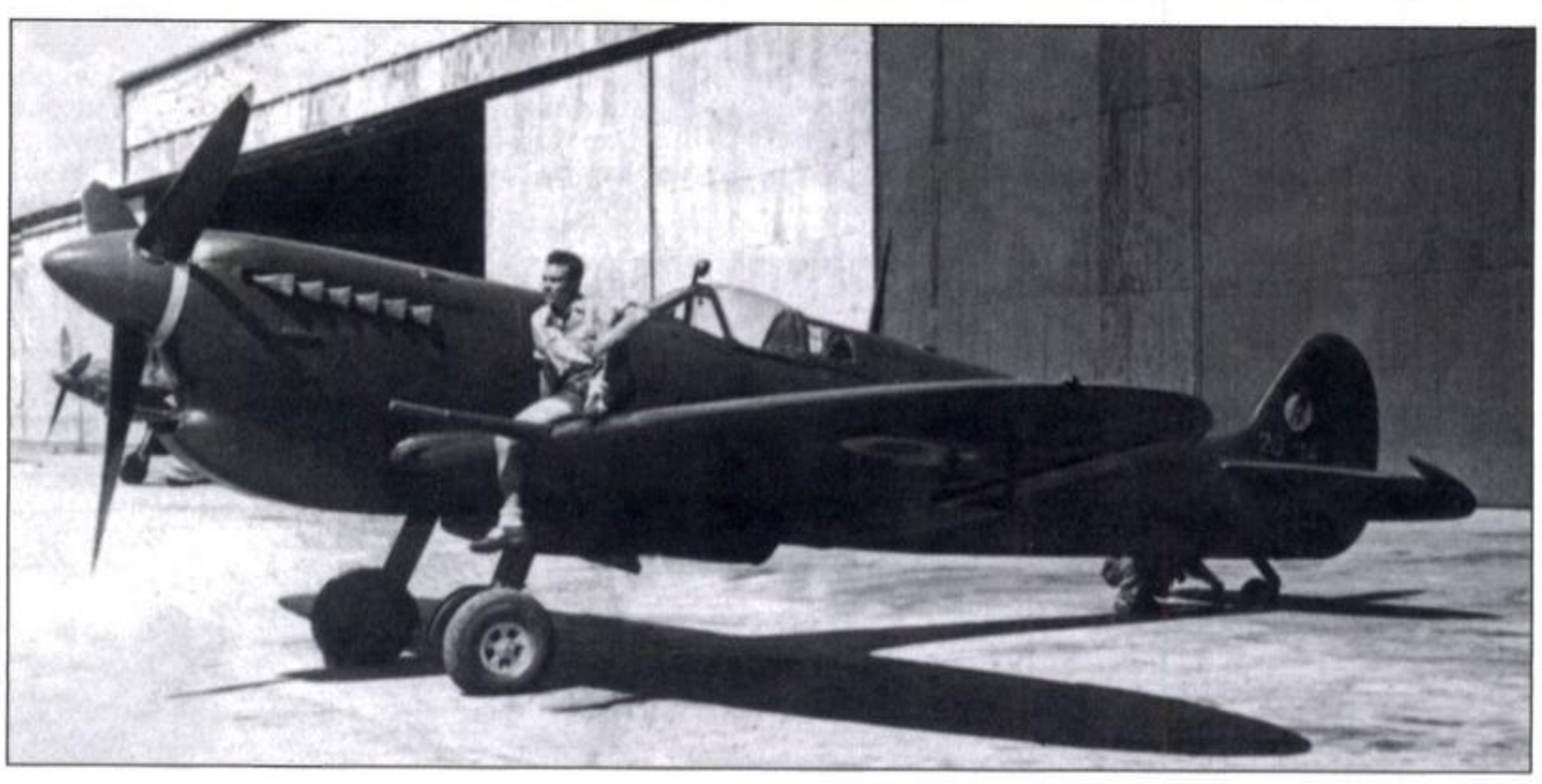


During October 1943, the 51° Stormo headquarters and the 155° Gruppo moved to Elmas airfield, near Cagliari; later, after a brief stay again at Monserrato, they moved to Galatina air base near Lecce, in southern Italy, and came under the control of the Aeronautica Cobelligerante. At Galatina air base the 51° Stormo was reorganised under the command of Ten.Col. Duilio Fanali. The flying units were the 20° Gruppo (commanded by Cap. Spadaccini) with the 356ª and 360ª Squadriglie; the 21° Gruppo (which had returned from the Russian theatre on 1 July 1943, where it had operated as an autonomous unit commanded by Cap. Dezzani) with the 351ª and 386ª Squadriglie; and the 155° Gruppo (commanded by Cap. Biccolini) with the 361ª and 378ª Squadriglie. Aircraft comprised 26 Macchi MC.202s, six Macchi MC.205s and four Reggiane RE.2001s.

On the day following the armistice, the unit was organised under the Raggruppamento Caccia which also included the 4° and 5° Stormi Caccia.

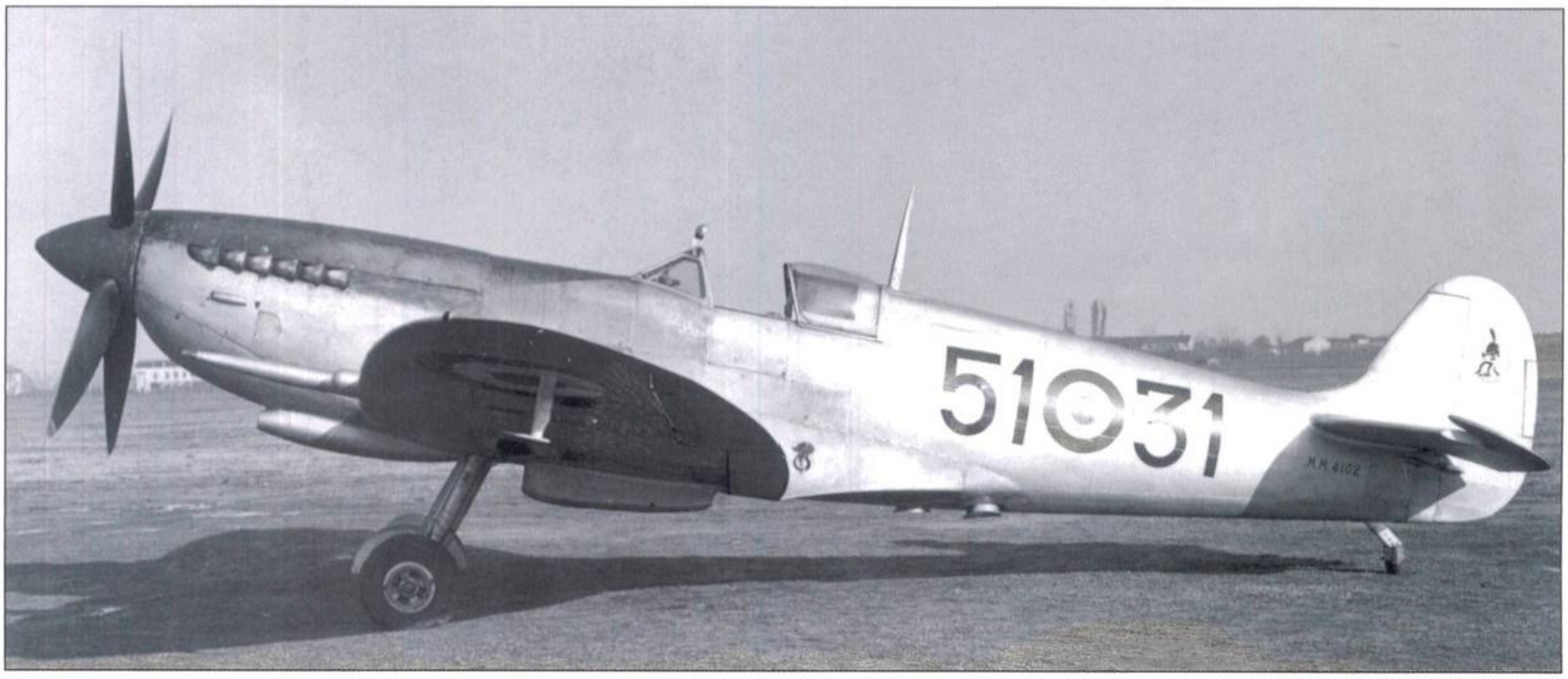
Some Macchi MC.205s had their two 12.7-mm machine-guns removed and replaced by an additional 200-litre (44-Imp gal) fuel tank so the Veltros could fly escort missions for SIAI S.81 bombers and Cant Z.1007 transport aircraft. This version was renamed the Macchi MC.205S (scorta).

On 3 March 1944 the 51° Stormo, after moving to Palata airfield, made its first official mission following the reorganisation, when 20 aircraft headed by Cap. Leoncini attacked German targets in Yugoslavian territory. At the beginning of May, the Stormo – by then completely equipped with the Macchi MC.205V – moved to Nuova Termoli, where it remained until the end of August, when it moved to the base of Leverano to operate over Greece. During the air campaign over Albania and Yugoslavia, the 51° pilots flew more than 3,800 hours and made 726 combat missions. In September 1944 the 20° Gruppo moved to Galatina airport, replacing its Macchis with 16 Spitfire Mk Vs received from surplus RAF stocks. The Spitfires were third-hand aircraft, having been used by No. 249 Squadron, RAF and later by No. 352 Squadron of the Yugoslavian Air Force. Before the end of October the other two groups of the 51° Stormo had also moved to Galatina.



Above left and far left: Tropicalised Spitfire Mk VCs of 20° Gruppo CT are seen at Lecce-Galatina in 1945. The covered aircraft carries an individual '20' identification number at the base of its fin.

At the end of the war, 20° Gruppo CT had 13 operational Spitfires Mk Vs. This immaculate Mk VC is seen at Galatina in 1945.



In January 1945 the unit moved again, to Canne, to reduce the flying time between Italy and Yugoslavia. The 51° Stormo's participation in World War II ended with its last mission on 5 May 1945.

The activities of the 51° Stormo between 10 June 1940 and 8 May 1945 can be detailed as follows: 28,049 flying hours; 2,387 combat missions; 203 dogfights; 483 strafing and ground attack missions; 265 enemy aircraft shot down, plus 102 aircraft probably shot down; and 20 enemy aircraft destroyed on the ground. Against this, 156 aircraft were lost during combat operations and 75 pilots died.

After the war, eight Gold Medals, 185 Silver Medals, 87 Bronze Medals and 58 War Cross Honours were granted to the personnel of the 51° Stormo.

51° Stormo from 1945 to today

After the end of World War II, the 51° Stormo and the other fighter units were based at Lecce-Galatina, equipped with Macchi MC.205Vs and Spitfire Mk Vs, and commanded by Col. Gino Callieri. During the spring of 1946 the 51° Stormo began to be equipped with Spitfire Mk IXs, and in 1947, headed by Col. Francesco Beccaria, the 51° Stormo prepared to move to northern Italy. The 20° and the 21° Gruppi moved initially for some months to Vicenza, but by June 1948 they had rejoined the 155° Group at Treviso San Angelo air base, headed by Ten.Col. Roberto Fassi, who succeeded Ten.Col. Francesco Sforza. The new home base of the 51° Stormo had been one of the heaviest-used airfields of the war, and was undergoing reconstruction after the heavy bomber raids.

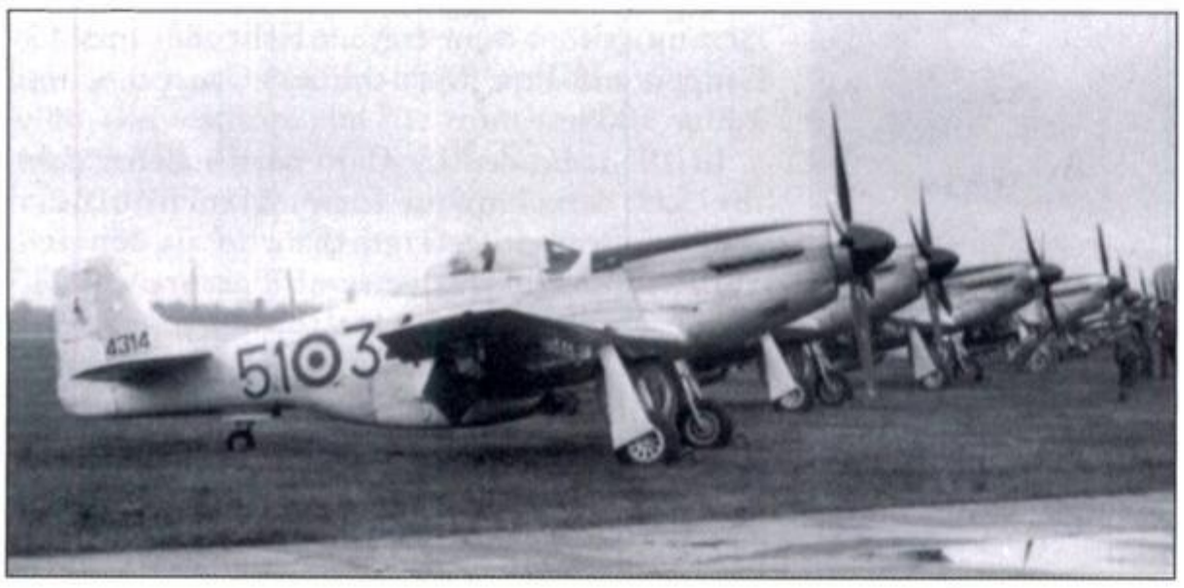
In September 1950 the 155° Gruppo was equipped with the North American P-51D Mustang, and on 1 January 1951 it officially moved to Ghedi air base, near Brescia, in order to reform the 6° Stormo Caccia Bombardieri. The two other groups of the Stormo flew the old and fatigued Spitfire Mk IX until 18

Above: Italian Mk IX Spitfires retained RAF serials until an order dated 16 February 1947 allocated AMI serial numbers. MK375 (later MM4077) and MA453 (MM4031) were later sold to Israel.

Top: Spitfire LF.Mk IX MM4102 of 155° Gruppo was photographed in the spring of 1947 at Treviso in a post-war overall silver scheme.

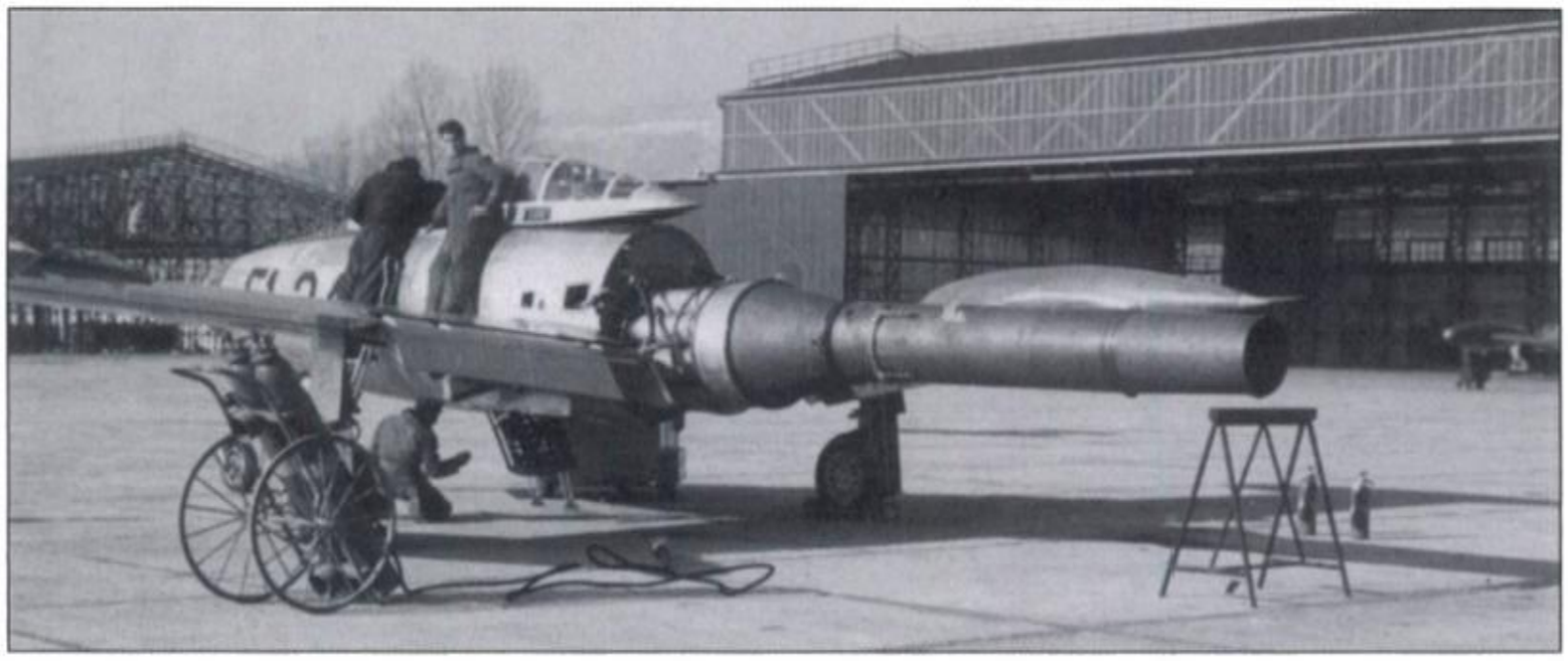
Below left: Nine 155° Gruppo CT F-51Ds lined up at Treviso in 1950, headed by MM4314 '51-34'.

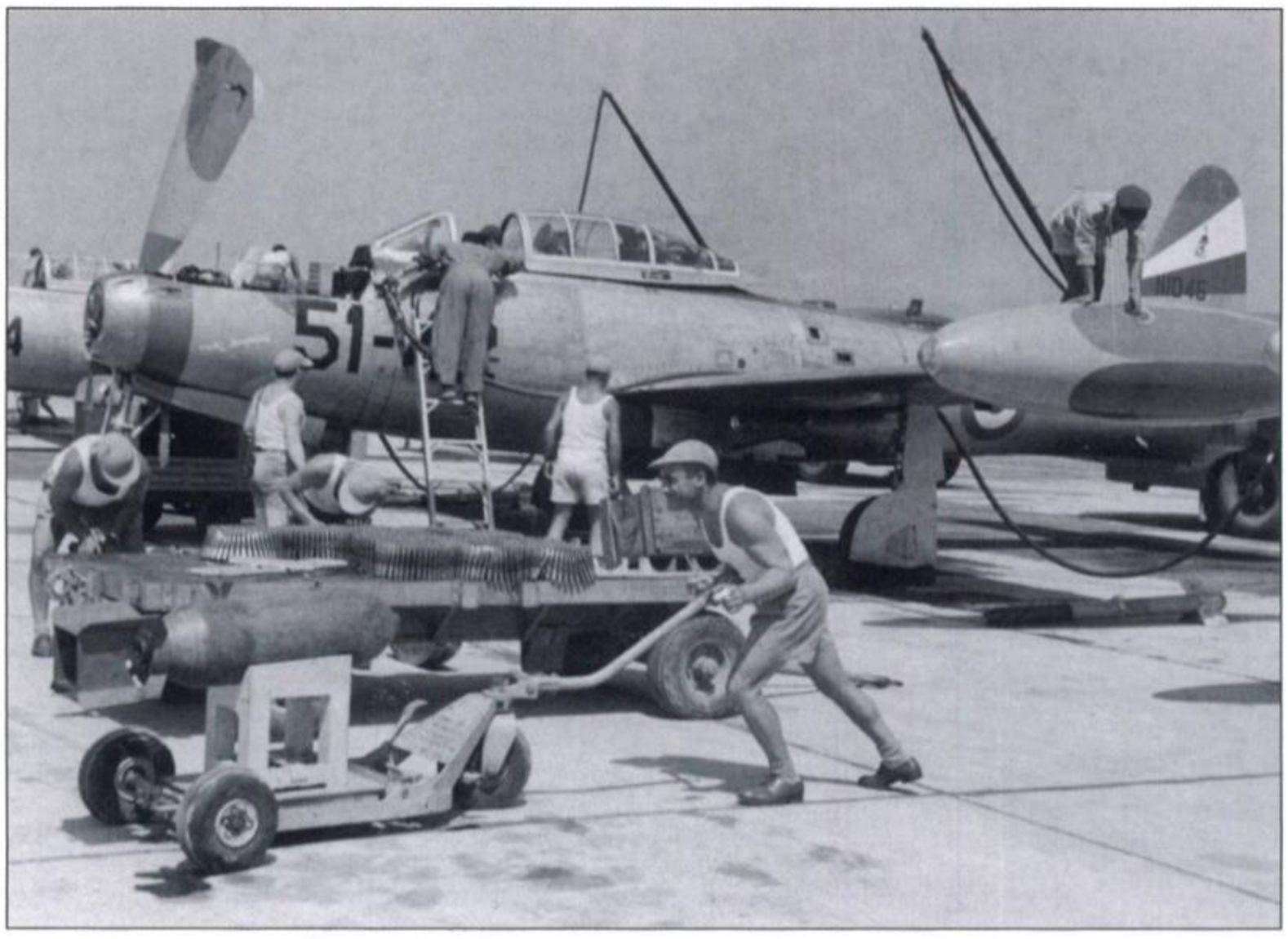
Below: With 'US Air Force 9908' just visible on its tail, F-47D-35-RA MM4641 (ex 44-89908) was one of a large batch of 'Jugs' delivered in 1951.



Above: Fiat G.59-4B MM53135, of the Squadriglia Collegamenti e VSV, started life as a -2B Srs 3, but was later modified with the cut-down rear fuselage and bubble canopy of the Dash-4.

Below: With its rear fuselage removed to allow access to its Allison J35-A-29 engine and tailpipe, a 20° Gruppo F-84G undergoes maintenance in the open at Aviano.





December 1950, when the first Republic P-47D-25 Thunderbolt landed at Treviso. Equipped with these aircraft, which had seen heavy use during the war, the 51° Stormo changed its primary mission and became the 51° Stormo Caccia Bombardieri. With the Republic aircraft, the 51° Stormo flew more than 13,000 hours in two years. On 1 November 1951 the 51° Stormo was assigned to the 56th TAF (Tactical Air Force) of NATO.

Headed by Col. Callieri, the Stormo began to equip with its first jets – the Republic F-84G – during October 1952, and moved to Aviano air base which was more suited to its new aircraft. In December that year the Stormo gained the newly reconstituted 22° Gruppo and the Squadriglia Collegamento e Volo Senza Visibilità. The 22° Gruppo still flew the P-47D and was based at Grottaglie air base near Taranto. The 51° Stormo headquarters remained at Treviso airport.

On 1 February 1953, following a major reorganisation of the Italian air force, the 51° Stormo officially became the 51ª Aerobrigata, with three flying groups assigned, the 20°, 21° and 22° Gruppi. During February 1954 the 51ª Aerobrigata moved to the new base of Istrana, near Treviso. In November 1955 the 20° Gruppo was temporarily disbanded, in order to form the 6° Gruppo Caccia Ogni Tempo equipped with the new F-86K. The 6° Gruppo became the first unit of newly reformed 1° Stormo which, organised under the 51ª Aerobrigata, was divided between two bases – Istrana, the home base of the 6° and 17° Gruppi, and Pisa, with the 23° Gruppo – until 1 June 1959.

In 1953, headed by Cap. Mario Bellagambi, the 51ª Aerobrigata formed an unofficial aerobatic team, the 'Tigri Bianche'. It flew two public demonstrations, at Ferrara (on 13 October 1953) and Istrana (on 20 June 1954), before becoming the official aerobatic team of

Finished in the colour scheme of the 'Tigri Bianche' ('White Tigers') display team, F-84G 51-11046 is seen being refuelled and loaded with ammunition and 'iron' bombs. The F-84G could carry up to 4,000-lb (1814-kg) of ordnance.

F-84G Thunderjet 'Tigri Bianche'

Above: The four Thunderjets of the 'Tigri Bianche' taxi in formation prior to another display, their airbrakes deployed.

The Tigri Blanche's signature manoeuvre was the 'Bomba' – a climbing 'bomb burst'. This was later replaced by a similar diving manoeuvre.

the Aeronautica Militare Italiana in 1955, headed by Cap. Roberto di Lollo. The 'Tigri Bianchi' name derived from the patch of the 351ª Squadriglia of the 21° Gruppo. The flying programme lasted 18 minutes.

'Tigri Bianche' trademark 'bomba'

On 8 August 1955 the 'Tigri Bianche' introduced the 'bomba' manoeuvre, in which the aircraft climbed skyward, splitting at the top of the climb. During such a display Cap. Di Lollo overheard a spectator say that if the 'bomba' was done by aircraft diving rather than climbing, it would be more spectacular; as a result, this new aerobatic 'bomb burst' move was introduced; after the pull-up from the dive the aircraft passed over the airfield from various positions, before rejoining the formation. During the team's two years, it performed 236 aerobatic displays, participating in 52 air shows in Italy and 10 outside Italy, with great success. The four aircraft of the team were painted with brilliant colours: on the tail were the three national colour bands with the patch of the 'gatto nero' (black cat) in the white band, tip tanks were red with white stripes and the front fuselage yellow with the blue band of the 21° Gruppo.

In 1957 the 51ª Aerobrigata received Republic's new fighter-bomber, the F-84F Thunderstreak. It was assigned to the 21° and the 22° Gruppi, under the command of Col. De Micheli. In the same year, the 51ª was awarded a NATO trophy as the most efficient unit.

On 1 May 1959 the 1° Stormo was disbanded, in order to form the 1ª Aerobrigata Intercettori Teleguidati, equipped with Nike AJAX and Hercules surface-to-air missiles. Headquarters was to be at Padua. The 51ª Aerobrigata gained the F-86Ks of the former 1° Stormo and re-equipped the 21° and 22° Gruppi, which also absorbed the disbanded unit's personnel. The 23° Gruppo was always based at Pisa but organised under the newly reformed 51ª Aerobrigata COT (Caccia Ogni Tempo).

A month after Col. Mario Bellagambi became commander of the 1ª Aerobrigata, the Reparto Volo Caccia Tattici Leggeri (RVCTL) was formed at Treviso San Angelo. It was organised into two groups – the 14° Gruppo and the 103° Gruppo – and equipped with the new Italian-built Fiat G91R, which won a NATO competition for a new light fighter-bomber. The RVCTL remained under 51ª Aerobrigata control for less than two years,

Parked next to the 51ª Aerobrigata standard, this F-84F displays a 'winged dragon' emblem on its nose – probably a Squadriglia device.

F-84F Thuderstreaks of 22° Gruppo CB (Caccia Bombardieri, fighter bomber) are seen lined up at Istrana. The first six aircraft are 53-6844, -6972, -6937, -6840, -6860 and -6852. A total of 150 F-84Fs was supplied to the AMI, equipping 5°, 6°, 8°, 36° and 50° Stormi, as well as 51° Stormo.

Left: While on the strength of 21° Gruppo CB, F-84F-76-RE 53-6976 is displayed with an array of ordnance – rockets and belted machine-gun ammunition – at Istrana in 1957.

because on 1 October 1964 the 2° Stormo CTRL (Caccia Tattici Ricognitori Leggeri) was reformed, based at Treviso San Angelo.

In 1963, many Italian pilots began another period of training as the F-104G was introduced. From 1 January 1963, crews and technicians of the 21° Gruppo were selected to transition to the Starfighter. During the same time, many crews of the 4ª Aerobrigata moved to Istrana for advanced training on the F-86K, flying these radar-equipped aircraft before making the transition to the F-104G.

In August 1963 the 23° Gruppo, after eight years in Pisa, moved to Rimini, still under 51ª Aerobrigata control. During September the 21° Gruppo sent its remaining F-86Ks to the 12° Gruppo of the 4ª Aerobrigata, and in April 1964 it moved to Cameri air base as an autonomous flying group. In June 1965, the 51ª Aerobrigata and its F-86Ks participated in Exercise Luce '65, providing technical and logistical support. During these years the 22° and 23° Gruppi at Rimini assumed the alert mission, temporarily moving some aircraft to other bases in southern Italy. In September 1965, the 21st Autonomous Group was incorporated into the newly formed 53° Stormo, ending its time with the 51ª Aerobrigata. In 1966 the 22° Gruppo received the Flight Safety Trophy from AFSOUTH, and in 1967 the 23° Gruppo won it.

On 12 September 1967, after another major reorganisation of the Italian air force, the 51ª Aerobrigata was renamed 51° Stormo. At the beginning of 1968, 22° Gruppo personnel moved to Grossetto for transition training on the F-104G Starfighter. In October 1968, the 51° Stormo won a 5 ATAF trophy for the high operational capability of the unit. In June 1969, the 22° Gruppo, temporarily based at Cameri, received the first F-104S, and the 51° Stormo became the first Italian AF unit to be equipped with the new version of the Starfighter. The 22° Gruppo returned to Istrana on 20 September. In

Left: Two Fiat-assembled 51° Aerobrigata F-86Ks fly together during 1960. The red tail band identifies 55-4858 as a 22° Gruppo CIO (Caccia Intercettori Ognitempo, fighter-interception, all-weather) aircraft, while 53-8290 with the yellow band is from 23° Gruppo CIO.

Below left: This well-worn NAA-built F-86K-17-NF 54-1275 carries a Sidewinder AAM launch rail under its wing, as retrofitted to some 'Kappones'. This aircraft initially served with the KLu before joining the AMI in May 1963.

Below: Wearing a 22° Gruppo COT patch ('Pluto' with a missile in his mouth), a pilot prepares to enter his slatted, late production F-86K.

September 1970, the 51° Stormo organised 'Best Hit', a major NATO exercise involving units assigned to 5 and 6 ATAF.

Officially named

On 1 January 1971 the 51° Stormo was officially renamed in honour of Ferruccio Serafini, one of the unit's pilots from World War II. In January 1972, the 22° Gruppo was declared combat ready on the F-104S. One year later, the 23° Gruppo left the 51° for the 5° Stormo, with its famous insignia of Diana the Huntress.

During the summer of 1973, Istrana was selected again as the base for 'Best Hit'. On 1 October that year, the old and honoured 155° Gruppo – which had left the 51° Stormo in 1951 to form the 6° Stormo based at Ghedi, later moving to the 50° Stormo – was reassigned to the 51° Stormo. The 50° Stormo had been based at Piacenza and equipped with the fighter-bomber version of the Starfighter.

The 51° Stormo become a dual-role unit, with the 22° Gruppo flying the mission of Caccia Intercettori (fighter-interceptor) and the 155° Gruppo that of Caccia Bombardieri (fighter-bomber). The two groups were equipped with versions of the F-104S. Starfighters assigned to the interceptor groups lacked the M61 gun, the gun bay being used for the avionics needed to launch AIM-7 Sparrow missiles.

During these years, 22° Gruppo Starfighters were deployed many times to Trapani and Sigonella to assure the coverage of southern Italian airspace. These deployments, which usually lasted 15 days, were shared by all the fighter groups of the Italian air force until 1983. At that time, the NODA (Nucleo Operativo Difesa Aerea) was formed and equipped with the F-104S, organised in a few months as the 18° Gruppo of the 37° Stormo.

During July 1976, the flying groups were deployed to Grosseto and Aviano to allow the rebuilding of Istrana's runway with a new system that would lessen the danger of take-offs and landings in heavy rain. Istrana was the first Italian AF base to use this new system.

On 31 March 1982 the 651ª Squadriglia Collegamenti retired the last T-33s in use with the Italian air force, ending a bit of history not only for 51° Stormo pilots but all the Aeronautica Militare Italiana.

The 155° Gruppo again left the 51° Stormo, on 1 January 1985, this time to be equipped with the new Tornado IDS. It was placed under the control of the 6° Stormo at Ghedi for the transition, before moving again to Piacenza to reform the 50° Stormo. This left only the 22°

Above: Reparto Volo Caccia Tattici Leggeri (RVCTL) G.91R-1A MM6298 '51-298' is seen on the tarmac at Istrana in 1964.

Top: Examples of three types under the control of 51° Stormo are seen in 1964: a 21° Gruppo F-104G, a 22° Gruppo F-86K and an RVCTL Fiat G.91R.

Bottom: F-104G '51-01', in the original unpainted condition, pops its braking 'chute upon landing at Cameri in 1964.

Below: Two 22° Gruppo F-104Gs, and a solitary RT-33A, head a line-up of F-86K Sabres at Istrana during the unit's transitional period in 1969.

Above: Aircraft from the three flying units of 51° Stormo are seen in the air during the early 1970s. F-104S '51-03' of 22° Gruppo leads F-86K 54-1297 '51-64' of 23° Gruppo with RT-33A target tug 53-5396 '51-81' of the 651ª Squadriglia Collegamento e Bersagli nearest the camera. Each aircraft displays the 51° Stormo 'sorci verdi' badge on its tail.

Top: Photographed from an MB.326, two 22° Gruppo CIO F-104S-ASAs armed with Aspides and AIM-9L Sidewinders patrol over the Dolomiti range. The camouflage scheme was replaced on many aircraft by grey in later years.

Below left: Replacing the Shooting Star within the liaison squadrons of the Italian air force in the 1980s, Macchi MB.326s were finished in bright orange, as seen on '51-77', throughout their service with 651ª Squadriglia.

Below and bottom: This Starfighter was painted with special 51° Stormo/22° Gruppo colours, on either side, at Istrana in 1995.

Gruppo and the 651ª Squadriglia Collegamenti e Soccorso at Istrana.

Nucleo Addestramento e Standardizzazione AMX was officially formed at Istrana on 1 January 1988, its purpose being to train pilots assigned to the new Italian-built Alenia AMX fighter-bomber. This aircraft went to the fighter-bomber units flying G91Rs (the 14° and 103° Gruppi of the 2° Stormo) and G91Ys (the 13° Gruppo of the 32° Stormo) and two Starfighter-equipped reconnaissance groups (the 28° and 132° Gruppi of the 3° Stormo).

One year later, following a reorganisation of the various flying units of the AMI, the 103° Gruppo was assigned to the 51° Stormo. It moved from Treviso San Angelo base to Istrana during 1989, for the transition to the AMX.

15 October 1998 marked the last mission of the F-104A/ASA of the 22° Gruppo, and the unit – the most awarded group in the Italian air force – officially disbanded on 30 January 1999. Everyone at Istrana is convinced that the 22° Gruppo will be reactivated soon, flying the new Eurofighter, but, unfortunately, probably not with the 51° Stormo markings.

51° Stormo today

The last AMI reorganisation involved a profound restructuring of the flying groups, in which many units were disbanded and others received new flying groups.

When the Italian air force command decided to disband the 3° Stormo, with its assigned 132° Gruppo 'Buscaglia', the 51° Stormo gained the famous group. It was equipped with AMXs modified to carry the Orpheus reconnaissance pod, previously used also by the Starfighters of the 3° Stormo. Following the restructuring, on 6 July 1999 the 132° Gruppo Caccia Bombardieri Ricognitori was assigned to the 51° Stormo and based to Istrana. Subsequently, the 51° Stormo, after the disbandment of the 22° Gruppo Caccia Intercettori, became a reconnaissance/fighter-bomber attack unit with two flying groups – the 103° Gruppo 'Redskins' and the 132° Gruppo 'Buscaglia' – and the 651ª Squadriglia Collegamenti Soccorso. The AMXs of the 103° Gruppo are coded from 51-01 and those of the 132° Gruppo from 51-30; the 132° aircraft also have the 'Buscaglia' signature on their tails.

Luigino Caliaro

Above: Replacing the earlier AB 204s operated by 651ª Squadriglia Collegamenti e Soccorso, the Agusta-Bell AB 212s, including hoist-equipped MM81146 '51-70', have a secondary mountain rescue role.

Top: A 22° Gruppo CIO F-104S, distinctively painted for the 50th anniversary of 51° Stormo formates with a 103° Gruppo CB AMX near Tre Crime di Lavaredo in 1989.

Below: Sitting outside a hardened aircraft shelter, this 132° Gruppo CBR (caccia bombardieri ricognitori – fighter-bomber-reconnaissance) AMX represents 51° Stormo's equipment in 2000.

103° Gruppo 'Redskins'

Formed at Lonate Pozzolo on 15 February 1943 as an independent dive-bomber squadron with Ju 87B/Rs, the 103° moved in the following month to Siena-Ampugnano, where from mid-April it began to receive the first Ju 87D-3s. Based in Sardinia on 18 May 1943, the squadron flew from Decimomannu and Chilivani until 11 July, when its 207th Flight moved urgently to Boccadifalco (Sicily) to oppose the Allied landing, launching its first attacks on the same day against enemy shipping off Licata. It returned to Siena on 14 July. Meanwhile, the 237° Gruppo was moved to Capua and then to Gioia del Colle and Crotone, entering combat on 12 July against the enemy in Augusta Bay, and continuing its operations on Sicily until 19 August. Having handed its few surviving aircraft to the 121° Gruppo, the 103° started to receive three Breda BA88Ms at Lonate Pozzolo. It was disbanded a few weeks later, after the armistice of 8 September 1943.

Newly activated on 15 June 1952 at Villafranca as the 103rd Fighter Bomber Squadron with F-47Ds, the unit moved briefly to Grottaglie, returning to Villafranca in March 1953 to be re-equipped with the F-84G. During 1956 the 103° Gruppo moved to Rimini, receiving its first F-84F. From May 1958, the group underwent conversion training on the new Fiat G.91 at Torino, and was the first Gruppo of the Italian air force to receive this aircraft, on 12 August 1958 at the Pratica di Mare airport. On 11 May 1959, after an intense evaluation on grass runways (Frosinone and Rivolto), the 103° Gruppo moved to Treviso where, in 1962, it received the new G91R. In preparation for the transition to the AMX, the 103° Gruppo moved to Istrana on 1 January 1989, received its first AMXs in September, and was deemed combat ready on the AMX in May 1991. On 20 December 1994 the 103° Gruppo received its first AMX-T two-seater. From August 1995 it took part in NATO air operations over Bosnia, and recently has been active over Kosovo in support of the UN.

103° Gruppo Stuka

103° Gruppo started out as a dive-bomber unit equipped with the Junkers Ju 87. 'Red 12', a Ju 87D-3 of 207ª Squadriglia, displays the colours and configuration adopted during the Gruppo's working up period in Sardinia during the summer of 1943. The squadriglia number is carried on the white theatre band, while its colour adorns the tip of the spinner. Wheel spats were removed for operations from rough strips. In Regia Aeronautica service the Ju 87 was known as the Picchiatello ('slightly crazy'), because of the angle of its dive.

With its drag 'chute still attached and canopy open, a 103° Gruppo CTRL, 2° Stormo CTRL Fiat G.91 taxis towards its parking spot after a sortie. Winner of the NBMR-4 (NATO Basic Military Requirement 4) competition, the 'Gina' served with 103° Gruppo CTRL from June 1958 until 1991.

Below: AMX MM7193 '51-07' (foreground) and MM7189 '51-03' display the 'Redskins' insignia on their tails and again on the port intake, the starboard side displaying the 51° Stormo CB badge. MM7193 displays a black fin band with the figure '20000', proclaiming 20,000 hours flown by the unit on the type. Note the Sidewinder acquisition round on the port wing-tip rail.

Below: Designed as a replacement for the Fiat G.91Y , the AMX has been dubbed 'the poor man's Tornado', but has proven to be both capable and reliable in Italian hands, taking part in operations over Bosnia in mid-1995. The AMI acquired 110 single-seaters, each able to lift around 8,380 lb (3800 kg) of bombs and rockets, including laser-guided munitions. Twenty-six AMX-T two-seaters were also acquired. This 103° Gruppo aircraft has a 'low-viz' version of the 'Redskins' emblem on its fin.

132° Gruppo 'Buscaglia'

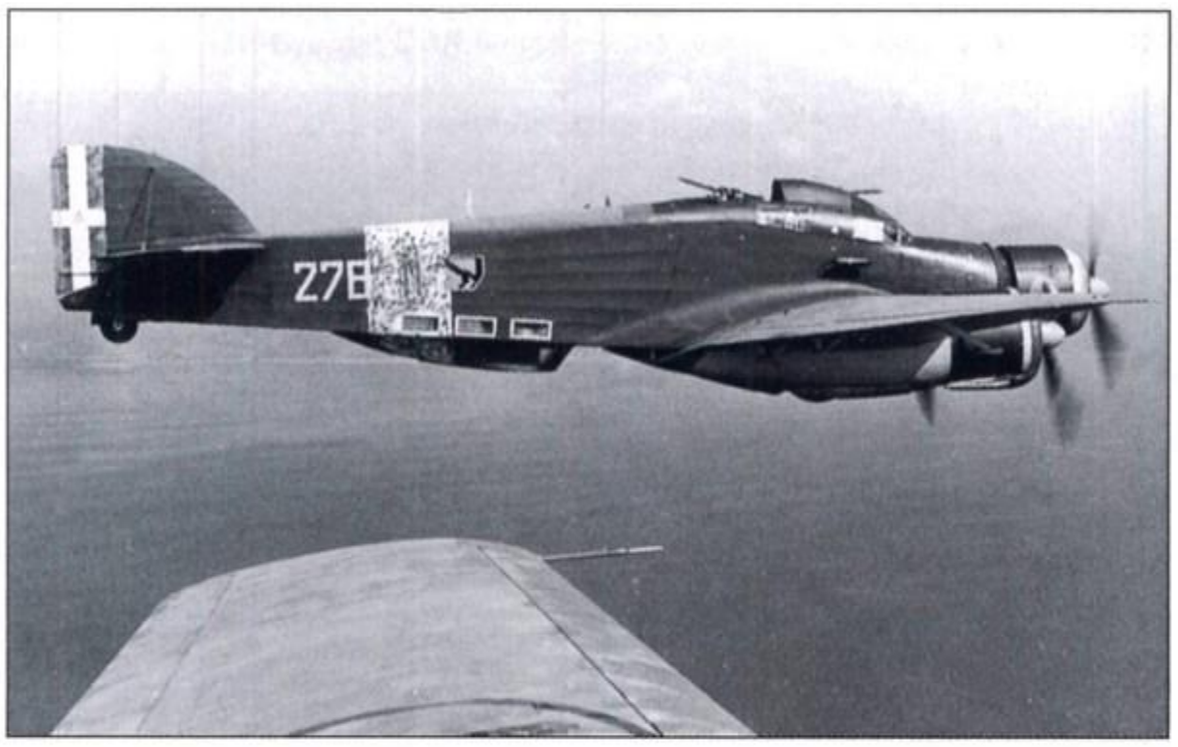
The 132° Gruppo was formed as the 132° Gruppo Autonomo Aerosiluranti on 1 April 1942, under the command of Maj. Carlo Emanuele Buscaglia, the most famous Italian S.79 pilot. It was formed from two Squadriglie, the 278ª and 281ª, which until then had fought as autonomous units and were commanded at different times by Buscaglia.

At the beginning of the war, the Torpedo Test Wing formed with six SM.79 Sparvieros; it flew more than 40 combat missions in two months, and caused more damage to the British fleet than other units of the Regia Aeronautica. For this reason, the Test Unit became the 278ª Squadriglia Autonoma Aerosiluranti, commanded in succession by Cap. Dequal, Cap. Erasi and Cap. Buscaglia. Flying this mission brought the crew to a dangerously low altitude over the sea, but was necessary to get close to a ship to launch the torpedo.

In 1942 the unit was based in Sicily, and in 1943 in Sardinia. At the close of the war, 10 pilots and crew were awarded the Gold Medal. After the armistice, the 132° Gruppo was based at Lecce, flying transport missions until the Stormo 'Baltimore' was formed when the US gave the Italian air force some examples of the Martin light bomber. During the first transition training phase, Commander Buscaglia died in a crash during take-off.

On 1 March 1954, the 132° Gruppo moved from Bari Palese air base to the new Villafranca air base, near Verona. From this base the Gruppo came under the 3° Stormo, specialising in the reconnaissance mission. From June 1954, the Gruppo received the F-84G equipped with a special camera pod mounted on a wingtip tank, and from December 1954 took possession of one of the best reconnaissance aircraft in the NATO inventory in those years, the RF-84F Thunderflash. In 1970 the 132° Gruppo started to exchange the RF-84F for the F/RF-104G Starfighter, always having reconnaissance as its primary mission, with a bomber capability as secondary.

In 1991 six Starfighters of the 132° Gruppo were deployed to Erhac, in Turkey, to fly the final combat missions of the F-104G in support of Desert Shield and Desert Storm operations over Iraq. At the end of Desert Storm, the Gruppo began to receive the new AMX, with light modification to the cockpit panels to enable the use of the Orpheus reconnaissance pod. In recent years, 132° Gruppo AMXs have flown several missions over Bosnia and participated in the Kosovo air campaign of 1999.



Above: One of the original squadriglias of 132° Gruppo was 278ª, equipped with a torpedo-bomber version of the SIAI-Marchetti SM.79. The unit was very busy during the fighting around Greece and Crete, sinking HMS Glasgow on 3 December 1940, having already damaged the light cruisers HMS Kent in September and HMS Liverpool in October.

Above: This flight of three Stormo 'Baltimore' aircraft is lead by aircraft '2'. The co-belligerent unit had 32 Baltimores, mostly Mk IVs, by 1945.

Below: RF-104G MM6634 of 28° Gruppo CR, 3° Stormo, carries the signature of C. E. Buscaglia, the original commander of 132° Gruppo.

Above: RF-84F Thunderflash 53-7394 served 3ª Aerobrigata for all of its service life (the units under the Aerobrigata's control being the only Italian operators of the type). Italy received a total of 78 Thunderflashes. The last was retired in 1974.

Above: 132° Gruppo is the latest to join 51° Stormo, being reassigned in 1999 following the disbandment of its long-time umbrella unit 3° Stormo. This 132° Gruppo aircraft AMX is seen at Istrana in 1995, immediately prior to seeing action in the NATO action over Bosnia.

Below: AMX attack aircraft provide the 51° Stormo's offensive capability in the early 21st century. Here examples from 103° and 132° formate for the camera.

651ª Squadriglia Collegamenti e Soccorso

The unit's origins date to 1 March 1952, when a Nucleo Strumentale di Volo was formed at Treviso San Angelo air base to train pilots destined to fly the new jet assigned to the 51° Stormo. The NSV was placed under the command of Ten. Laurenti, and the first aircraft assigned were Stinson L-5 Sentinels – not the best aircraft for instrument flying. Later, SAI S7s, C-45 Expeditors, Fiat G59s, Macchi 416s, Piaggio P.148s and North American T-6 Texans were received. In addition to instrument flight training, the unit flew also liaison, and in 1953 it became the Squadriglia Collegamenti e Volo Senza Visibilità.

With the Fiat G59, the Squadriglia flew target-tug missions. In 1956 it received the T/RT-33A Shooting Star, with which it flew reconnaissance and training missions. The T-33 was a precious aircraft for the 51° Stormo, because the young new pilots assigned to the Stormo could fly some training missions before starting with the F-86K. In 1967 came a change of name to the 651ª Squadriglia Collegamenti e Bersagli, and its T/RT-33s flew target-tug, liaison or training missions. When the T-33s were retired, Aermacchi MB.326s were assigned to cover the fast liaison and training missions. Target towing was cancelled when the new Starfighters were introduced.

Following a restructuring of search and rescue within the AMI, the Squadriglia – based in northern Italy – gained helicopters, including the AB 47S, AB 204 and AB 212. The 651ª Squadriglia Collegamento e Soccorso currently operates three AB 212s fully equipped for SAR operations in the mountains and over water, and two SIAI S.208s for short-range liaison. It also has one or two Aermacchi MB.339As, used for fast liaison and to allow high-ranking officers fulfilling ground tasks or assigned to 5 ATAF command to remain current.

Above: Beech C-45 'RM-55' is seen at Istrana while with the Squadriglia Collegamento e VSV.

Above: Ambrosini S7 single-seater '51-70' of the Nucleo Volo Strumentale in 1952 at Treviso.

Above: Also with the Nucleo Volo Strumentale in 1952 was Piaggio P.148 MM53582 '51-90'.

Above: SIAI S.208M MM61940 '51-86' was at Istrana in March 1982, along with Agusta-Bell AB 204s '51-81' and '51-80' (below).

Right: The AB 204s were replaced by AB 212s, such as '51-82' (MM81151).

Above: Two Squadriglia Collegamento e VSV Fiat G.59s sit next to one of the unit's C-45s at Treviso.

Lockheed T-33As (such as MM51-9249 '51-88', right) served from 1956, initially in the training role. Liaison and target-towing duties followed before the type was replaced by the MB.326. '51-81' (53-5396) is an RT-33A target tug of 651ª Squadriglia Collegamento e Bersagli.

Above: Carrying an Orpheus reconnaissance pod on the centreline station, this AMX carries 60th anniversary markings under the cockpit and a toned-down 132° Gruppo CBR badge on the intake.

Below: The three principal types serving with the 651ª Squadriglia Collegamenti are seen here – MB.339A (nearest the camera), SIAI S.208M and the Agusta-Bell AB 212.

Bottom: For their 50th anniversary, the 'Redskins' (103° Gruppo) adorned this AMX with a large native American head and a yellow flash on the forward fuselage.

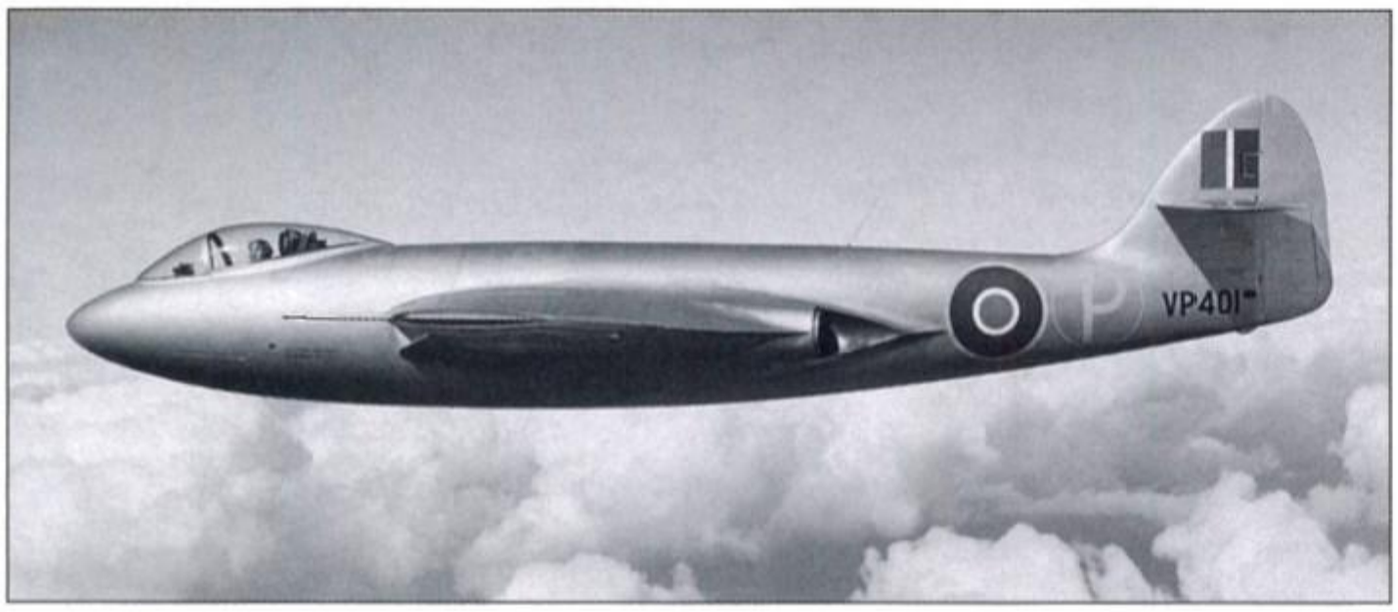
Hawker Hunter

Created under the guiding hand of famed Hawker designer Sydney Camm, the P.1067 Hunter was the RAF's standard single-seat fighter from 1954 until 1960 and the first home-produced swept-wing fighter to serve in the RAF in large numbers. Over 1,000 were delivered to that service and many more were exported, especially after the type was adapted for a ground-attack role. Always a crowd pleaser when displayed in public, a handful remains in service in 2000.

Formed in 1982, on the occasion of the IAF's Golden Jubilee, the Indian Air Force's 'Thunderbolts' display team was provided by No. 20 'Lightning' Sqn, operating Hunter Mk 56As from Hashimara. Initially comprising six aircraft, the team was strengthened to nine machines before being stood down in 1988.

BA 312
A4 84

Before P.1067



VP401, the first P.1040, made its first flight at Boscombe Down on 2 September 1947, powered by a 4,500-lb (20-kN) thrust Rolls-Royce Nene I. Here the aircraft is seen after the installation of 'pen nib' jetpipe fairings, but before the fitting of an acorn fairing at the junction of the fin and tailplane.

Far right: Though rejected by the RAF, P.1040 served as the basis for a naval prototype to Specification N.7/46. Two aircraft were built, the second of which (VP422) is seen here. As well as armament and equipment for carrier operations, the Sea Hawk, as the type became in FAA service, featured a lengthened fuselage and wingspan and was powered by a 5,000-lb (22-kN) thrust Nene RN.4 (Mk 101).

VX279 (right) was the second of two P.1052s built to evaluate swept wings for future use in fighter aircraft. '279 was later rebuilt as the sole P.1081 with swept tail surfaces and a straight-through jetpipe (below), first flying in this form in 1950. The RAAF expressed interest in a Tay-powered production variant, but the Tay was cancelled, the RAAF lost interest and a fatal crash finally ended the programme.

The design process that eventually led to P.1067 and the Hunter began with P.1035, Hawker's first jet-powered project. This scheme envisaged the installation of a Rolls-Royce B.41 in the centre fuselage of an F.2/43 Fury, but was overtaken by a more detailed design incorporating bifurcated jetpipes – P.1040. With little performance advantage over the Gloster Meteor, P.1040 found little favour with the RAF, but attracted the interest of the FAA, as yet without a carrierborne jet fighter. Thus was born the Sea Hawk, which entered service in 1953. Meanwhile the development of swept wings prompted the construction of two P.1052 research aircraft. Though considered for series production, P.1052 was not proceeded with as other potentially more promising designs were 'in the pipeline'. One of these was P.1067.

It is perhaps a cliché to repeat the old adage that "if an aircraft looks right, it will fly right" in relation to the Hawker Hunter, an aircraft regarded by many as the most graceful and beautiful jet fighter ever built. Many believe that the Hunter does indeed look absolutely 'right' and there can be few pilots who have experienced the Hunter who would not praise the fighter's superb handling characteristics. The Hunter is one of those increasingly rare beasts – a fighter which is a joy to fly, fun to fly simply for the enjoyment of flying – a favourite mount for solo aerobatics or a tailchase. And the constituency of pilots who have experienced the Hunter is a large one! The backbone of RAF Fighter Command and RAF Germany during the late 1950s and early 1960s, the Hunter went on to be a popular and widely used advanced trainer: until the late 1970s, every RAF fast-jet pilot began his career flying the aircraft. The Hunter was also very widely exported, and remained in service for many years in most of the air forces with which it served.

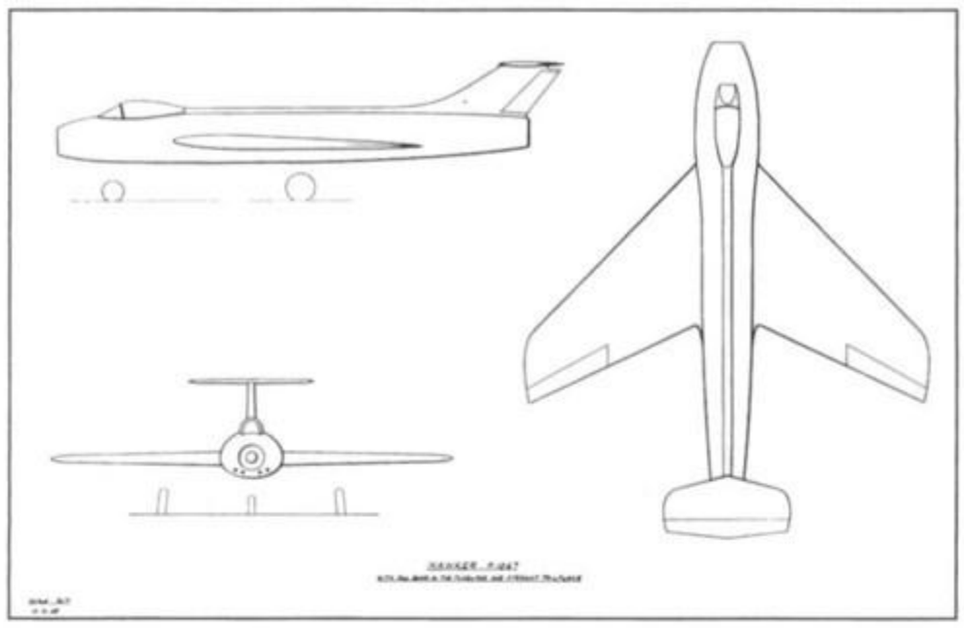
There have been dissenting voices, of course. Those associated with the Hunter in its earliest days experienced frequent engine surges, and flew an aircraft which was not really fit for operational service. One early export customer was so dissatisfied with its aircraft (and with the vestigial after-sales support it received) that its aircraft were dumped within three years of service and sold back at scrap value, most of the aircraft having been used for fewer than 50 hours.

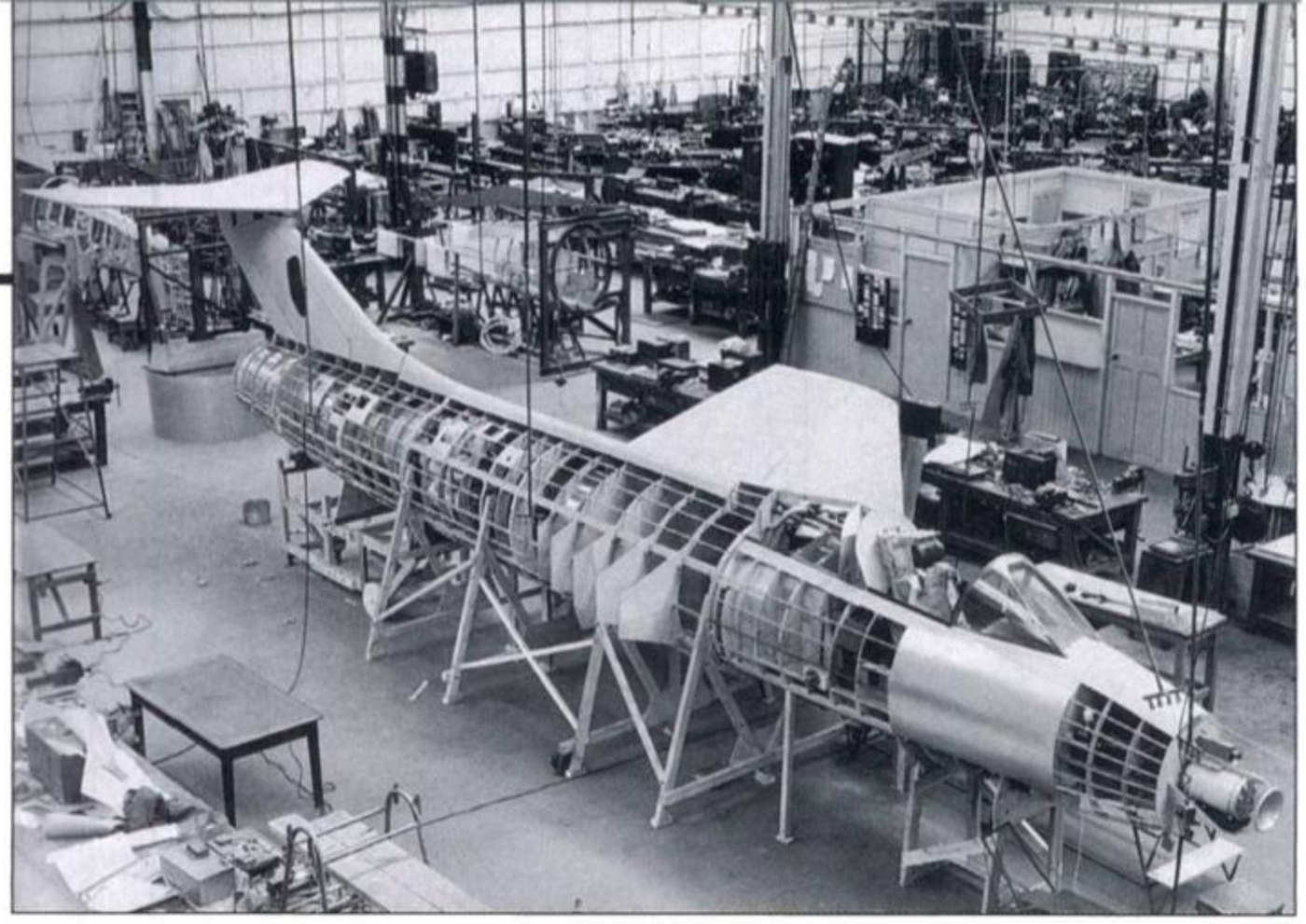
The Hunter was never a terribly good aircraft in which to instruct, not least because the heavy and 'draggy' twin-stickers seldom had a powerful big-bore engine. Many people who have written about the Hunter have been ex-Hawker engineers or salesmen, and some have been very scathing about the Folland Gnat trainer, maintaining that the Hunter T.Mk 7 would have been a better replacement for the Vampire T.Mk 11. Few who instructed in the two types at No. 4 FTS would concur, however. In later years, some instructors who experienced the Hawk could themselves become very scathing about the Hunter, although on the Tactical Weapons Training Units the faster Hunter was held by most to be a more useful aircraft. Similarly, some of the last generation of fast-jet trainees who experienced both the Hunter and the Hawk also preferred the later aircraft, with its more forgiving manners and its more ergonomically designed cockpit. But such feelings were never universal, and the Hunter remained the more popular aircraft type for many instructors and students. Regardless of how people felt in the 1980s, no-one could seriously doubt that, in the late 1950s, the Hunter was among the best and most popular aircraft types in service – a classic and a legend in its own lifetime.

Generations enthralled

The feelings of those lucky enough to fly a Hunter were echoed by those who could only stand and watch. Generations of ground crew, aircraft spotters, air show attendees and aircraft watchers have been entranced by the Hunter, over all the decades of its service. Crowds thrilled to displays by the 'Black Arrows' of No. 111 Squadron during the late 1950s, to mock airfield attacks by No. 229 OCU or No. 38 Group Hunters throughout the 1960s, and to the awesome displays of grace and precision by teams like the 'Patrouille Suisse' and the Royal Navy's 'Blue Herons' during the 1960s and 1970s. Even in the 1980s, Hunters provided some of the most memorable moments for air show audiences, particularly at the lower profile displays, where pilots felt less watched by the top brass and where perhaps they could show off more of the aircraft's abilities. Two FRADU Hunter GA.Mk 11s gave just such a performance at one of Middle Wallop's air displays, and Boscombe Down's Dave Southwood performed memorable and spectacular shows in the MoD's last flying single-seater at venues like Badminton.

There is a tendency to assume that the Hunter has been a





F.3/48 and P.1067

After two specifications issued in 1946 had failed to produce a Meteor replacement for the RAF, Hawker set about designing an interceptor powered by Rolls-Royce's new AJ.65 engine (later named Avon), beginning work in 1947. Without waiting for the issue of official requirements, P.1067 was submitted to the Air Ministry in January 1948. In March Specification F.3/48 was issued and Hawker officially invited to tender P.1067. Detailed design work began in May and in June a contract was signed for three prototypes – two powered by AJ.65 Avons and a third by an Sa.6 Sapphire.

success story since its birth. This is partly because its tremendous achievements have over-shadowed any transient difficulties, and partly because its occasionally troubled birth was conducted in a state of semi-secrecy, without the glare of enormous media attention. Memories of the war years were still fresh, with their many slogans and injunctions to secrecy, and people could easily accept that the raging Cold War might demand similar precautions. During the 1950s, cameras were not allowed at the RAF's Battle of Britain Displays, and aviation magazines, such as they were, gave away little beyond broad generalities.

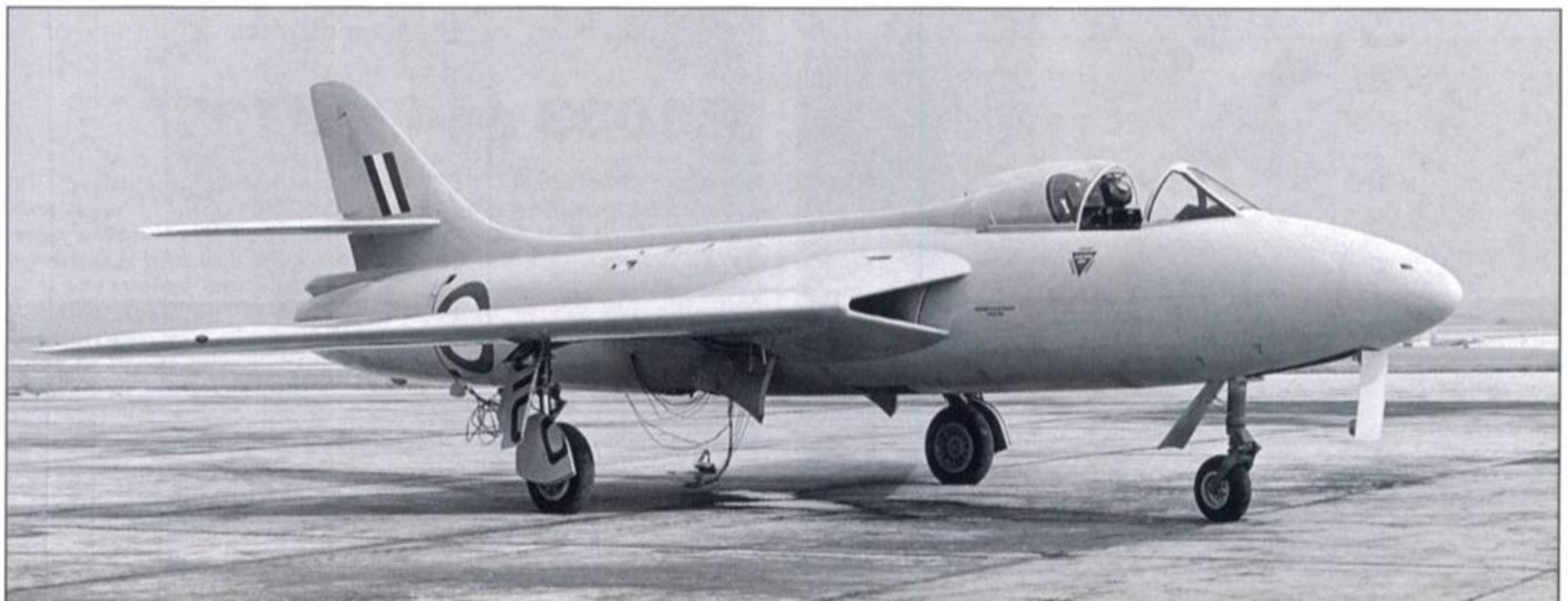
Against this background, optimistic-sounding, clipped public school voices on the weekly Movietone or Pathé newsreels reported only the good news. People knew that the Hunter was new, they knew it had swept wings, they knew that it was being built rapidly and in large numbers. When Neville Duke went record-breaking they knew about that, too. However, they did not know was that the aircraft was late entering service, that Hunters stood in open storage awaiting the installation of their 'afterthought' airbrakes, or that 10 F.Mk 1s were lost within two years when they ran out of fuel, a sad indictment of the aircraft's endurance. Nor did the public hear about the problems with gun firing, which included unacceptable pitching moments, engine surges and even structural damage. By comparison, though, the troubles of its rival, the Supermarine Swift, proved far more serious and far more intractable.

The Hunter can trace its origins to World War II, when the limitations of the RAF's early jet fighters convinced the Air Staff that the Meteor and Vampire should be interim fighters, and that replacements were badly needed. Hawker based its first jets on the Rolls-Royce B.41 engine, which became the Nene, and soon settled on the use of wingroot intakes (like the Vampire) combined with patented bifurcated jet pipes at the trailing edge of the wing. By keeping the inlet ducts and jetpipe as short as possible, thrust losses were kept to the minimum. The private venture Hawker P.1040 was judged by the RAF to offer too few improvements over the later Meteor variants, but the Royal Navy wrote Specification N.7/46 around the

Above left: By December 1948, P.1067 looked like this, with a fuselage of elliptical cross-section, a nose air intake, wings with a 42½° sweep angle (at quarter chord) and a straight, tapered T-tailplane. Powered by an Avon RA.2 of 6,000-lb (26.69-kN) thrust, the aircraft was armed with four 20-mm cannon and had an all-up weight of 12,000 lb (5443 kg).

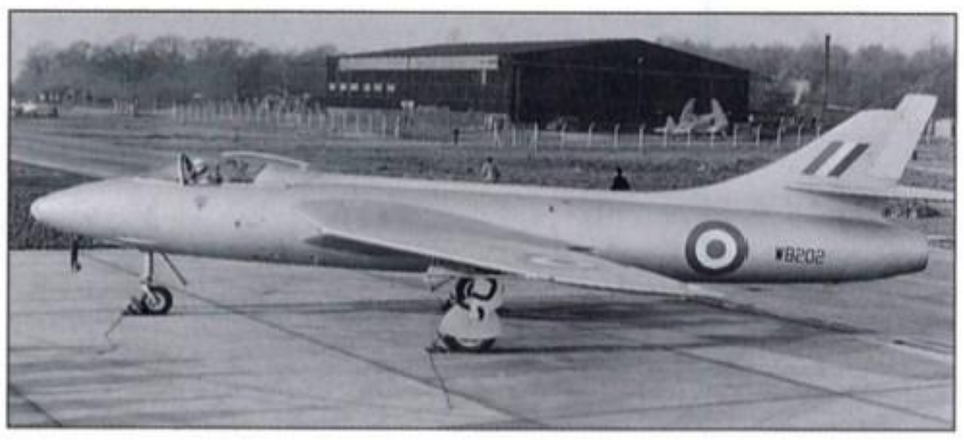
Top and left: Two months later the design had a fuselage of circular cross-section, a 6,500-lb (64-kN) Avon RA.5 and a projected top speed of Mach 0.90. Wing root intakes had replaced the nose intake and a full-scale mock-up was contructed, seen here in views of the experimental workshop at Kingston. The results of wind-tunnel tests, which suggested that the T-tail would cause control problems, have yet to be acted upon.

Far left: This view of P.1067 WB188, taken prior to the 1951 SBAC display, shows how the aircraft's planform had developed from the first P.1067 designs. Of an aerodynamically efficient design, the Hunter's wing bestowed a superior dive speed and stability compared with the contemporary F-86 Sabre.



Prototype P.1067 WB188 is seen immediately before its 20 July 1951 first flight, in the hands of Neville Duke. Note the fairing over the jetpipe housing a spin-recovery parachute. The colour scheme used was a paler derivative of that employed by the FAA on the undersurfaces of its aircraft and became known within Hawker as 'duck-egg green'.

Above: The second prototype, WB195, flew on 5 May 1952. By then known as the Hunter, the aircraft was finished in the overall 'duck-egg green' scheme applied to the first aircraft, but differed in being equipped with a full set of ADEN cannon.



Right: Three so-called 'hand-knitted' P.1067s were built, the third of which was the silver-finished, Sapphire-engined WB202 – effectively the Hunter F.Mk 2 prototype. After its first flight on 30 November 1952, '202 was employed in gun-firing trials. These were successfully completed and gave no clue to the problems that were to arise later with damage caused by spent ammunition linkages.

aircraft to cover further design work and the construction of three prototypes. The P.1040 (which soon became the Sea Hawk) thus became Hawker's first jet fighter, and the company's first Royal Navy fighter not to be derived from a land-based RAF fighter.

The P.1040 was a model programme, producing an aircraft with exemplary handling characteristics, excellent maintainability, and (despite the reservations of the RAF) stellar performance characteristics. The Sea Hawk looked conventional, however – like a Vampire with a conventional tail unit – and by the time the first P.1040 flew on 2 September 1947, the experts believed that swept wings marked the future. The P.1040 quietly made progress, achieving Mach 0.77 (510 mph; 820 km/h) even with its plank-like wing, which was considerably better than any Meteor and represented less than the full potential of the P.1040 itself, as was later proved by the production Sea Hawk.

The P.1040 continued to be regarded as an anachronism by the RAF, although the service did take more notice when two early airframes were completed as the P.1052 prototypes to meet the 'Experimental' specification E.38/46. The P.1052 was a Sea Hawk with a 35° swept wing – the first pressure-plotted wing fitted to a British jet. The first P.1052 made its maiden flight on 13 April 1949, and soon demonstrated blistering performance capabilities, including a top speed of 640 mph (1030 km/h) at sea level, and Mach 0.85 at 40,000 ft (12192 m). Many still believe that the aircraft could and should have been rushed into service with the RAF, and that a production P.1052 would have been a superior aircraft to the Sabre in key respects, and a useful tool in the Korean War.

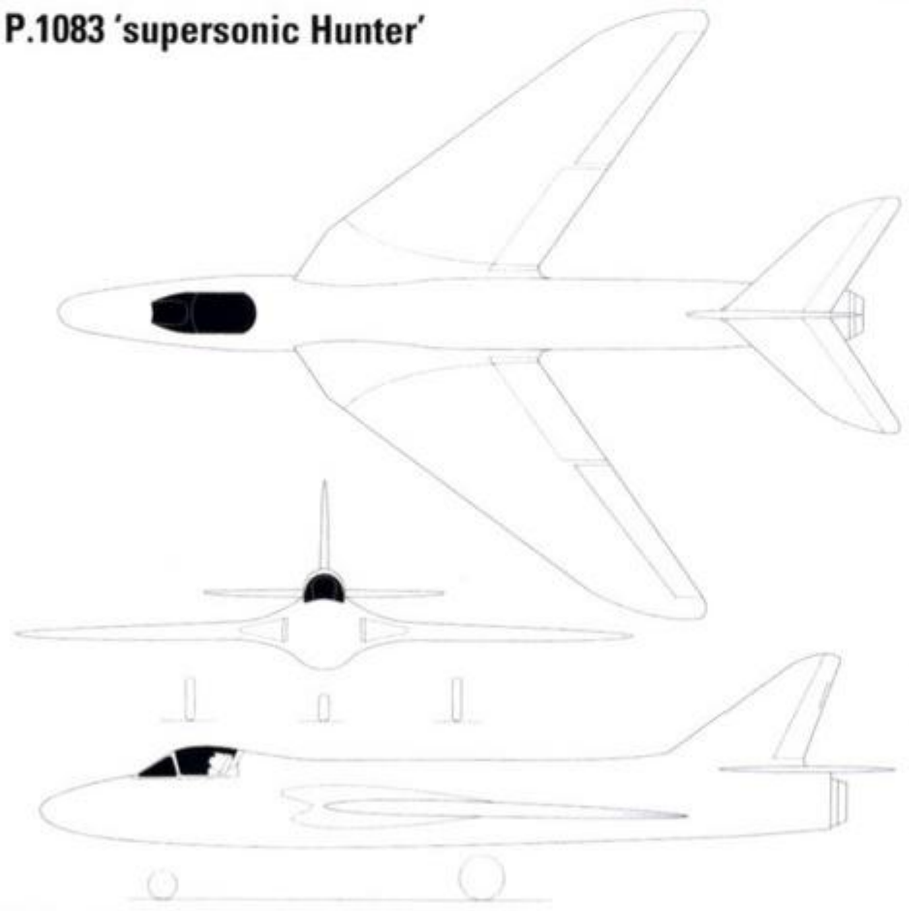
Rolls-Royce was then working on a lighter-weight afterburning derivative of the Nene (which became the Tay) and, prompted by an Australian requirement for a Meteor F.Mk 8 replacement, the second P.1052 (VX279) was rebuilt at Kingston as the P.1081. The aircraft had a new rear fuselage with a conventional 'straight-through' jet pipe in place of the bifurcated exhausts, and featured swept fin and tailplanes. Delays with the Tay meant that the Nene was retained, and RAAF interest in the type waned. This was unfortunate, since the P.1081 was an excellent little aircraft, quite capable of meeting or almost meeting every part of the specification which eventually led to the definitive Hunter, and proving capable of a level speed of Mach 0.89 at 36,000 ft (10973 m).

Avon and Sapphire

By the time the P.1081 made its first flight, on 19 June 1950, British thinking had turned away from centrifugal-flow turbojets like the Nene and Tay and toward the new axial-flow engines, particularly the Rolls-Royce AJ.65 (later Avon). The slimmer cross-section of the axial-flow engine enabled designers to reduce drag, while the configuration offered greater growth potential. In the late 1940s, though, a number of technical problems still had to be overcome, and many still feel that the axial-flow engine was too immature for a production fighter application at that time. This was probably true of the Rolls-Royce Avon, on which the RAF then pinned its hopes, though the Armstrong Siddeley Sapphire (derived from the wartime Metrovick F9) was very much better. The RAF, though, was as determined that its new fighter would have a modern axial-flow turbojet engine (which meant the Avon) as it was that the aircraft would have swept wings.

This was made clear in Specification F.43/46, which originally called for a twin-engined fighter. F.43/46 was eventually abandoned and redrafted as F.3/48, but its salient points remained largely unaltered, and Hawker's principal F.43/46 contender, the P.1067, was adapted to meet the new requirement. Thus, the RAF's revised Specification F.3/48 which led to the Hunter presumed the use of an

P.1083 'supersonic Hunter'



Right: P.1083 was to have been the 'supersonic Hunter', powered by an Avon RA.19 with reheat and using a new, thinner wing with 50° of sweep. Though a production fuselage was allocated for conversion to prototype standard, and a serial number (WN470) allotted, the aircraft was cancelled on 9 July 1953.

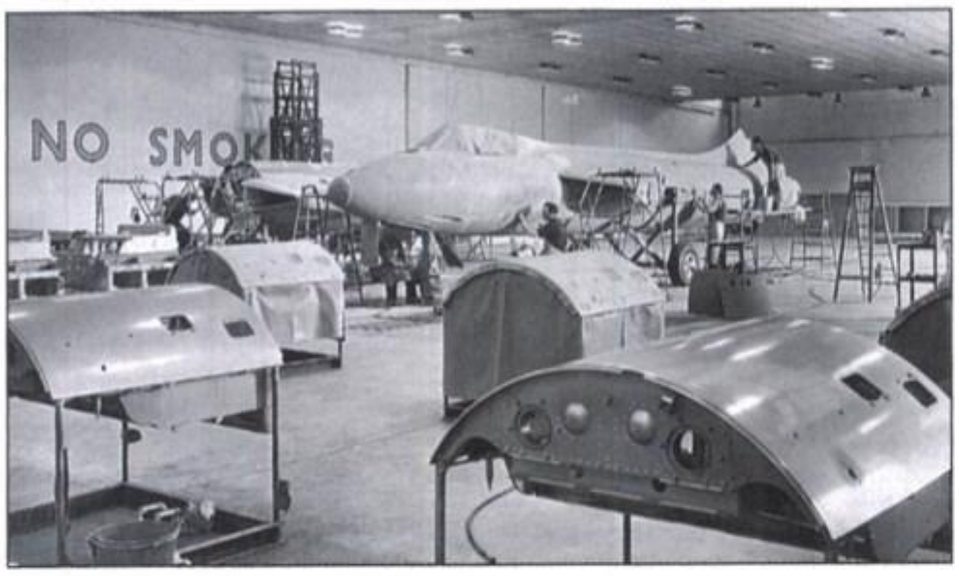
WB188 lifts off from RAF Tangmere for the 7 September 1953 record-breaking run. A pointed nose cone and highly raked, curved windscreen had been added to the aircraft, which attained a speed of 722.2 mph (1163.22 km/h) – a new World Absolute Speed Record.

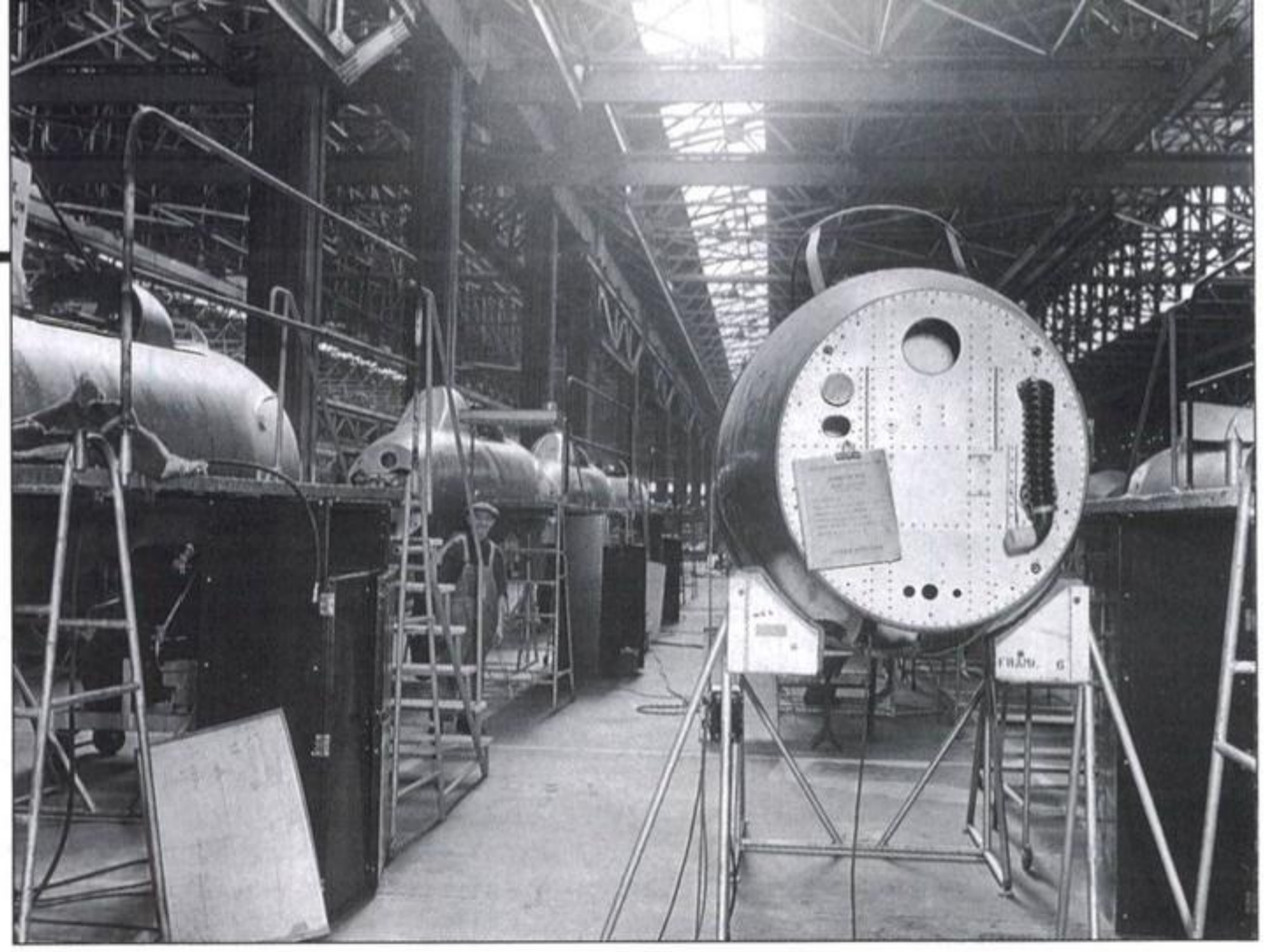
P.1083 and WB188

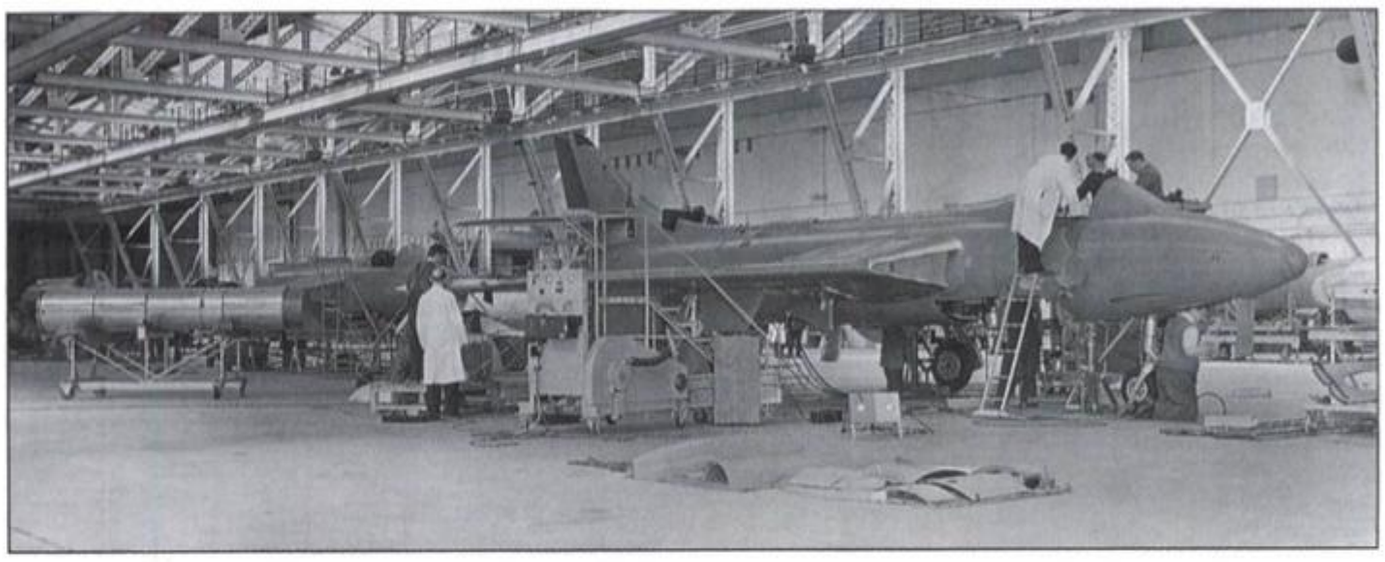
Hunter prototype WB188 was grounded in December 1952 and modified as a Hunter Mk 3 test bed for systems intended for P.1083 – the Avon RA.19 with reheat, a new fuel system (including internal wing tanks) and lateral airbrakes fitted either side of the fuselage, below the tailplane. However, the development of the Avon 200-series engine, which promised 'dry' thrust figures better than those for the RA.19, plus the expected thirst of the afterburning Avon 100 led the Air Staff to look at P.1083 again and elect cancellation on 13 July 1953. An attempt on the World Absolute Speed Record followed.

Production – F.Mk 1

The first production Hunter F.Mk 1 (WT555) flew in May 1953 and was followed by the remaining 112 aircraft from the first order placed with Hawker Aircraft at Kingston-upon-Thames. These aircraft were serialled WT556/595, WT611/660 and WT679/700, the last of which were completed in November 1954. A second batch of 26 Mk 1s was ordered from Hawker's Blackpool factory (WW599/610, WW632/645), the first of these making its first flight in July 1954. All of those aircraft completed in 1953 were allocated to trials work; only WT558 saw RAF service, albeit briefly, with No. 54 Sqn.







axial-flow turbojet, while Operational Requirement (OR) 228/3 dictated use of the AJ.65 (albeit with provision for using the Armstrong Siddeley Sapphire as an alternative).

F.3/48 was drafted around the P.1067, and was issued to Hawker Aircraft. It called for a single-seat, land-based day fighter capable of worldwide operation and optimised for the interception of high-flying, high-speed bombers (like the B-47) as soon as possible after they had been detected by radar, and while they were still as far as possible from their targets. The Air Ministry's experts translated the requirements into a series of parameters, including a time to a height of 45,000 ft (13716 m) of less than six minutes from start-up. The aircraft was also expected to be able to climb at 1,000 ft (305 m) per minute at 50,000 ft (15240 m), and to be capable of reaching at least 547 kt (1009 km/h) at 45,000 ft (13716 m). The aircraft was to have an endurance of 1.25 hours, including the specified climb to 45,000 ft and 10 minutes' combat at full power. The specification required a take-off distance of 1,200 yd (1097 m) to clear a 50-ft (15-m) obstruction, and required the fitting of an ejection seat, a ranging radar and an armament of two 30-mm ADEN cannon, or four 20-mm Hispanos.

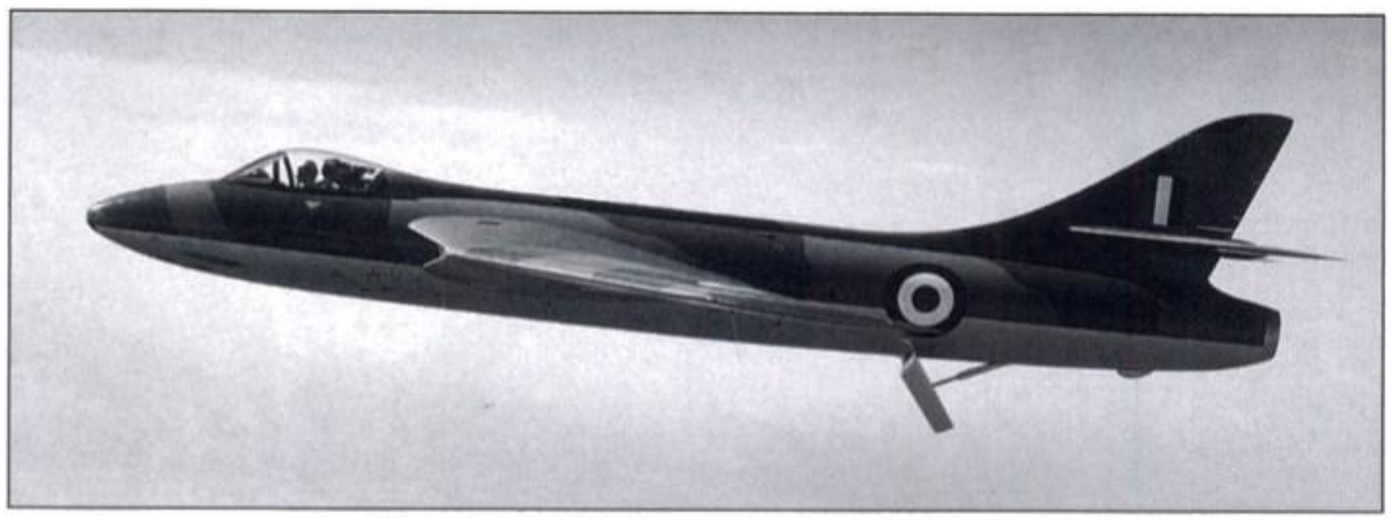
The new fighter was originally intended to use two 30-mm ADEN cannon or a single 4.5-in (11.4-cm) recoilless gun, although development of the latter weapon was abandoned. The requirement crystallised around the 30-mm ADEN, either two guns with 10 seconds' firing time (200 rpg) or four guns with 7.5 seconds' firing time (150 rpg). Provision was to be made for an alternative armament of four 20-mm Hispano cannon, with 15 seconds' firing time, but the latter option was not to prejudice the 'primary' options. Provision was also to be made for an air-to-air rocket battery (like that fitted to the F-86D) or for beam-riding Blue Sky AAMs.

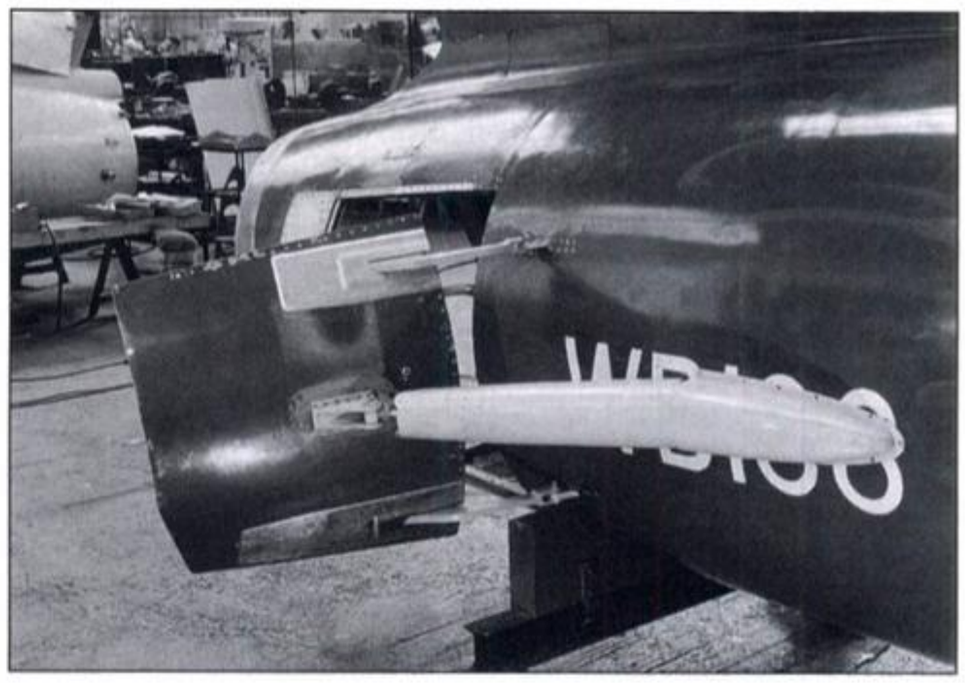
Hawker began work on the P.1067 after abandoning the P.1065 – which bore an astonishing resemblance to the

Hunter Mk 1s are seen in various stages of manufacture at Hawker's Blackpool factory, from initial fuselage construction (top), through final assembly (above) and painting (left).

On 16 May 1953 WT555 made its first flight from Dunsfold and was engaged in handling and performance trials shortly afterwards. Note that an airbrake was not fitted and that the shell case and ammunition link chutes end flush with the aircraft's skin.

Far left: The third production Hunter Mk 1 (WT557) made a demonstration tour of Denmark and the Low Countries in an attempt to drum up sales for the new fighter.





While earlier Hawker jet designs had employed a split flap-type dive brake system, such an approach was tested (using WB195) and considered ineffective for an aircraft with the speed of the P.1067. The Air Fighting Development Squadron (part of the CFE) then trialled the deployment of the aircraft's wing flaps as a means of slowing the aircraft, but discovered that an alarming downward pitch was the usual result. Hawker than fitted a pair of brakes to the rear fuselage of WB188 (top right), but this too caused pitch problems. Finally a ventral brake was selected, though its exact positioning under the Hunter's rear fuselage was the subject of a prolonged series of test flights in early 1954. Hunter Mk 1 WT594 is shown (above) with its brake fully deployed, with 67° of deflection.

Far right: No. 54 Sqn was the third unit to receive F.Mk 1s and the first Hunter squadron to form a display team representing No. 11 Group. Here a quartet of aircraft is seen practising prior to an appearance at the 1955 SBAC airshow at Farnborough.

Below: No. 43 Sqn's Hunters – exemplified by WT588/'P' – carried their code letters in an unusual rear fuselage position. Note also the link collectors, retrofitted to some Mk 1s.

Supermarine Swift. The original P.1067 was a mid-wing, all-swept, T-tailed fighter with an elliptical fat fuselage and four 20-mm cannon in the long shark-like nose, and with twin underwing intakes. The design evolved, and (as the P.1067/1) soon featured a pitot-type nose intake and wings swept at 42.5° at quarter chord. The fuselage cross-section was then altered to a circular shape, and two of the four guns were relocated in the wingroots.

Rolls-Royce then questioned the efficiency of the over-long intake duct (which also had to snake around the cockpit tub) and suggested a return to wingroot intakes. This was supported by avionics experts, who felt that the intake centrebody was too small and too restricted for any likely ranging radar. Hawker's chief designer, Sidney Camm, proved hard to convince, but was eventually persuaded, perhaps tempted finally by the fact that the wingroot intakes would give more volume for fuel in the tightly-packed fuselage. The change added 50 per cent more space to the cockpit, which had become alarmingly cramped. The aircraft was by now recognisably a Hunter, albeit one with a T-tail. The first P.1067 mock-up was constructed in this configuration.

Further changes were required before metal could be cut. P.1052 experience showed that increased tailplane sweep was required, prompting the relocation of the tail to a point roughly halfway down the fin. The cannon installation was also redesigned, becoming an easily interchangeable four-gun pack (complete with magazines) which could be winched out of the aircraft, leaving only the barrels *in situ*, to be replaced by a pre-loaded replacement. The cannon had only seven seconds' firing time (135 rpg), to give a better, more reliable feed, although the pilot could opt to fire only one pair of cannon to save ammunition or extend firing time. Unconfirmed suggestions have been made that it was this four-cannon pack which swung Camm around against the nose intake. This configuration, known as the P.1067/5, was selected as the standard for the three prototypes ordered in November 1948.

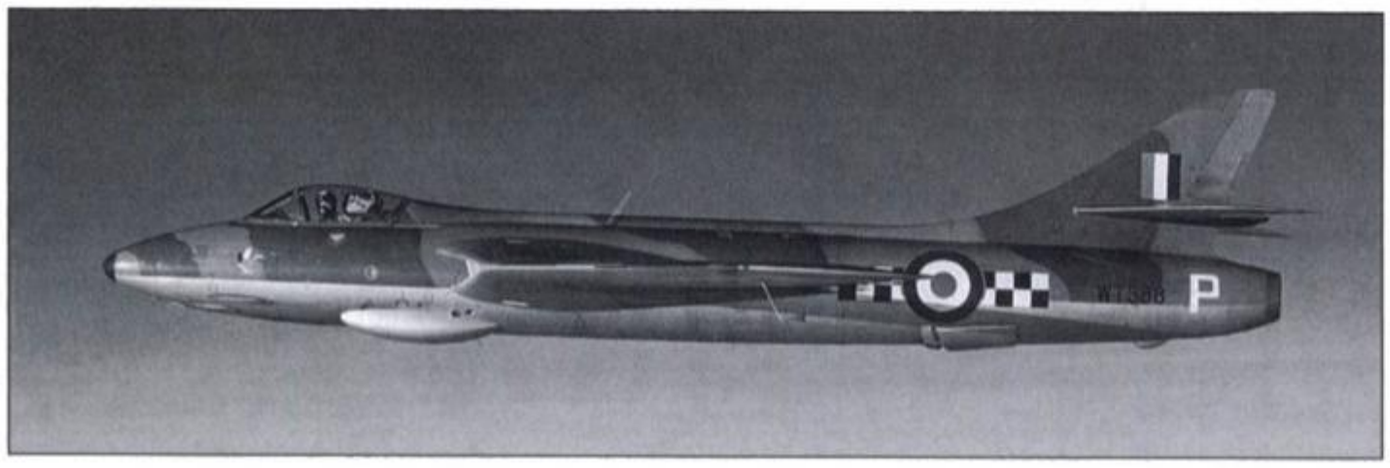
Three prototypes

The first two P.1067 prototypes (WB188 and WB195) were powered by Rolls-Royce Avon engines, but the third (WB202) was powered by an Armstrong Siddeley Sapphire. The first aircraft was completed with an Avon 103 (the basic Canberra Avon) rated at only 6,500 lb st (28.91 kN), and had ballast instead of a gun pack following attempts to replace the four-ADEN pack with four 20-mm Hispano cannon. This was claimed to be a weight-saving measure, but was suspected of being an ill-disguised piece of Treasury-driven parsimony.

The three prototypes were built at Hawker's Langley workshops, but the grass aerodrome at this site was unsuitable for test flying and the aircraft were assembled and flown from Dunsfold, except for the first aircraft, which was taken to Boscombe Down for its first flight. It was at this stage that WB188 (painted duck-egg green overall) was united with the first flight-cleared Avon received by the company. By the time Neville Duke (who

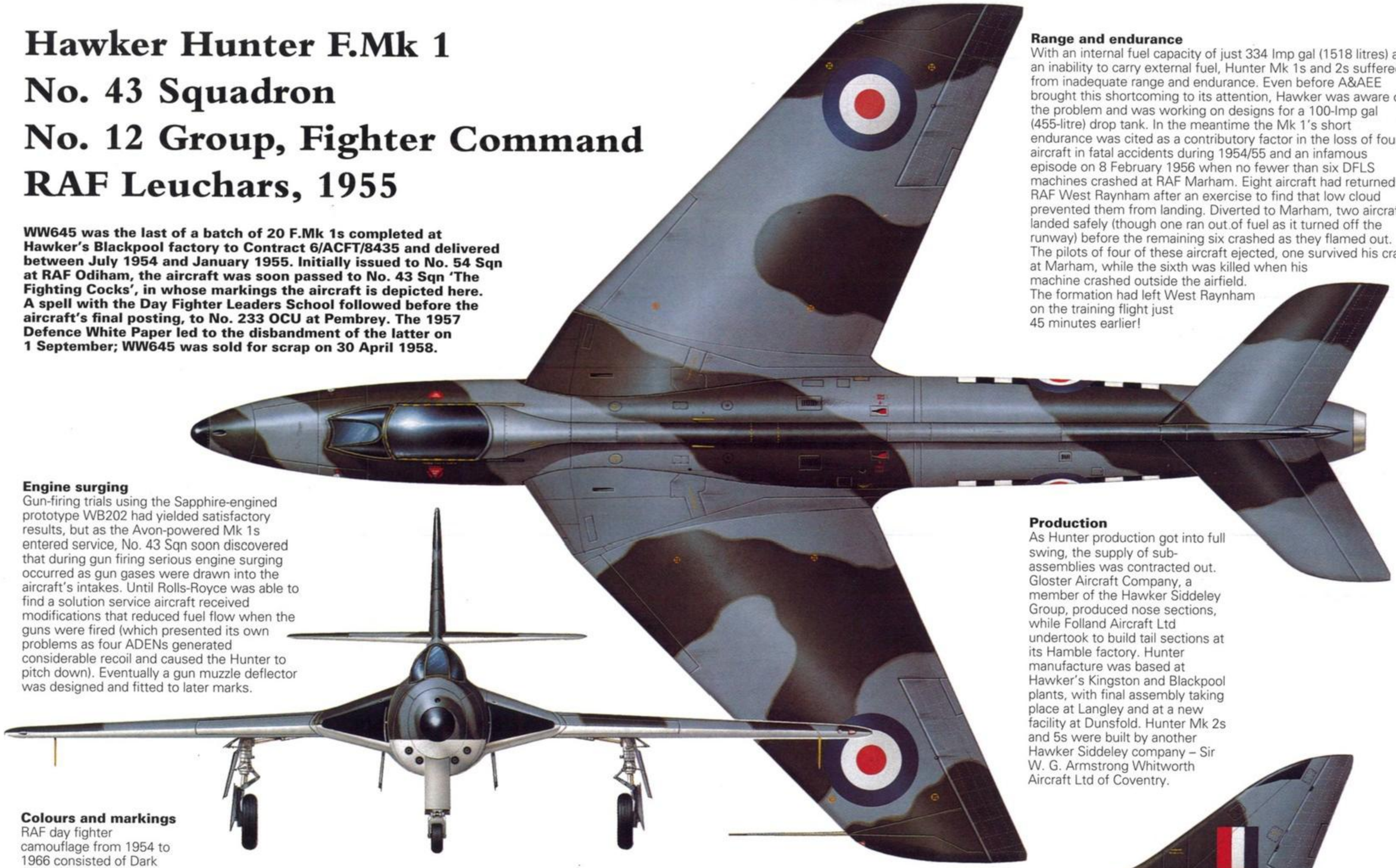
Into service

Meteor F.Mk 8-equipped No. 43 Sqn introduced the Hunter F.Mk 1 into RAF service in July 1954 and was followed in its re-equipment by No. 222 Sqn later in the year and No. 54 Sqn in February 1955, both units also relinquishing Meteor Mk 8s. No. 229 OCU also received 25 Mk 1s for conversion purposes. Though No. 43 operated its Mk 1s for two years, the early Hunter's career with the other units was shorter – just seven months in the case of No. 54 Sqn. All three squadrons received Hunter Mk 4s during 1956/57.



Hawker Hunter F.Mk 1
No. 43 Squadron
No. 12 Group, Fighter Command
RAF Leuchars, 1955

WW645 was the last of a batch of 20 F.Mk 1s completed at Hawker's Blackpool factory to Contract 6/ACFT/8435 and delivered between July 1954 and January 1955. Initially issued to No. 54 Sqn at RAF Odiham, the aircraft was soon passed to No. 43 Sqn 'The Fighting Cocks', in whose markings the aircraft is depicted here. A spell with the Day Fighter Leaders School followed before the aircraft's final posting, to No. 233 OCU at Pembrey. The 1957 Defence White Paper led to the disbandment of the latter on 1 September; WW645 was sold for scrap on 30 April 1958.

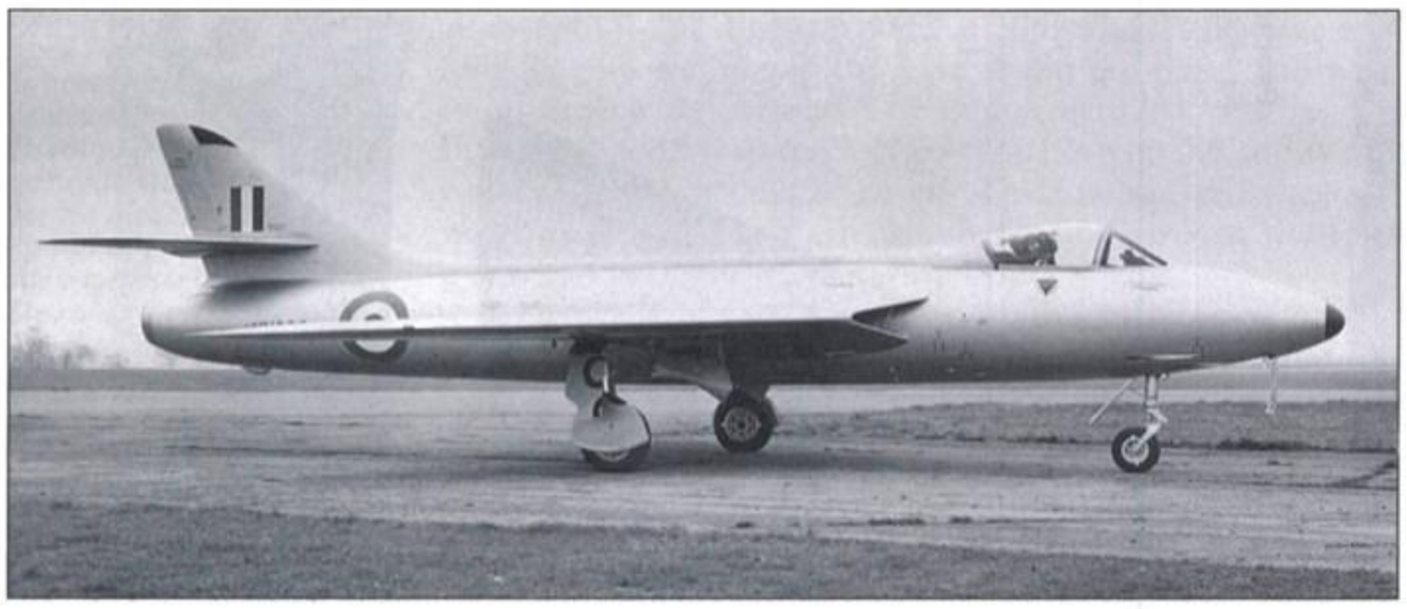


Range and endurance
With an internal fuel capacity of just 334 Imp gal (1518 litres) and an inability to carry external fuel, Hunter Mk 1s and 2s suffered from inadequate range and endurance. Even before A&AEE brought this shortcoming to its attention, Hawker was aware of the problem and was working on designs for a 100-Imp gal (455-litre) drop tank. In the meantime the Mk 1's short endurance was cited as a contributory factor in the loss of four aircraft in fatal accidents during 1954/55 and an infamous episode on 8 February 1956 when no fewer than six DFLS machines crashed at RAF Marham. Eight aircraft had returned to RAF West Raynham after an exercise to find that low cloud prevented them from landing. Diverted to Marham, two aircraft landed safely (though one ran out of fuel as it turned off the runway) before the remaining six crashed as they flamed out. The pilots of four of these aircraft ejected, one survived his crash at Marham, while the sixth was killed when his machine crashed outside the airfield. The formation had left West Raynham on the training flight just 45 minutes earlier!

Engine surging
Gun-firing trials using the Sapphire-engined prototype WB202 had yielded satisfactory results, but as the Avon-powered Mk 1s entered service, No. 43 Sqn soon discovered that during gun firing serious engine surging occurred as gun gases were drawn into the aircraft's intakes. Until Rolls-Royce was able to find a solution service aircraft received modifications that reduced fuel flow when the guns were fired (which presented its own problems as four ADENs generated considerable recoil and caused the Hunter to pitch down). Eventually a gun muzzle deflector was designed and fitted to later marks.

Production
As Hunter production got into full swing, the supply of sub-assemblies was contracted out. Gloster Aircraft Company, a member of the Hawker Siddeley Group, produced nose sections, while Folland Aircraft Ltd undertook to build tail sections at its Hamble factory. Hunter manufacture was based at Hawker's Kingston and Blackpool plants, with final assembly taking place at Langley and at a new facility at Dunsfold. Hunter Mk 2s and 5s were built by another Hawker Siddeley company – Sir W. G. Armstrong Whitworth Aircraft Ltd of Coventry.

Colours and markings
RAF day fighter camouflage from 1954 to 1966 consisted of Dark Green and Dark Sea Grey upper surfaces over Aluminium (silver) undersides. Squadron markings carried by No. 43 Sqn 'The Fighting Cocks' aircraft comprised black and white check bars either side of the Type 'D' roundels, while a cockerel in fighting pose and wearing boxing gloves was applied to the nose of some aircraft.



Sapphire-engined Mk 2

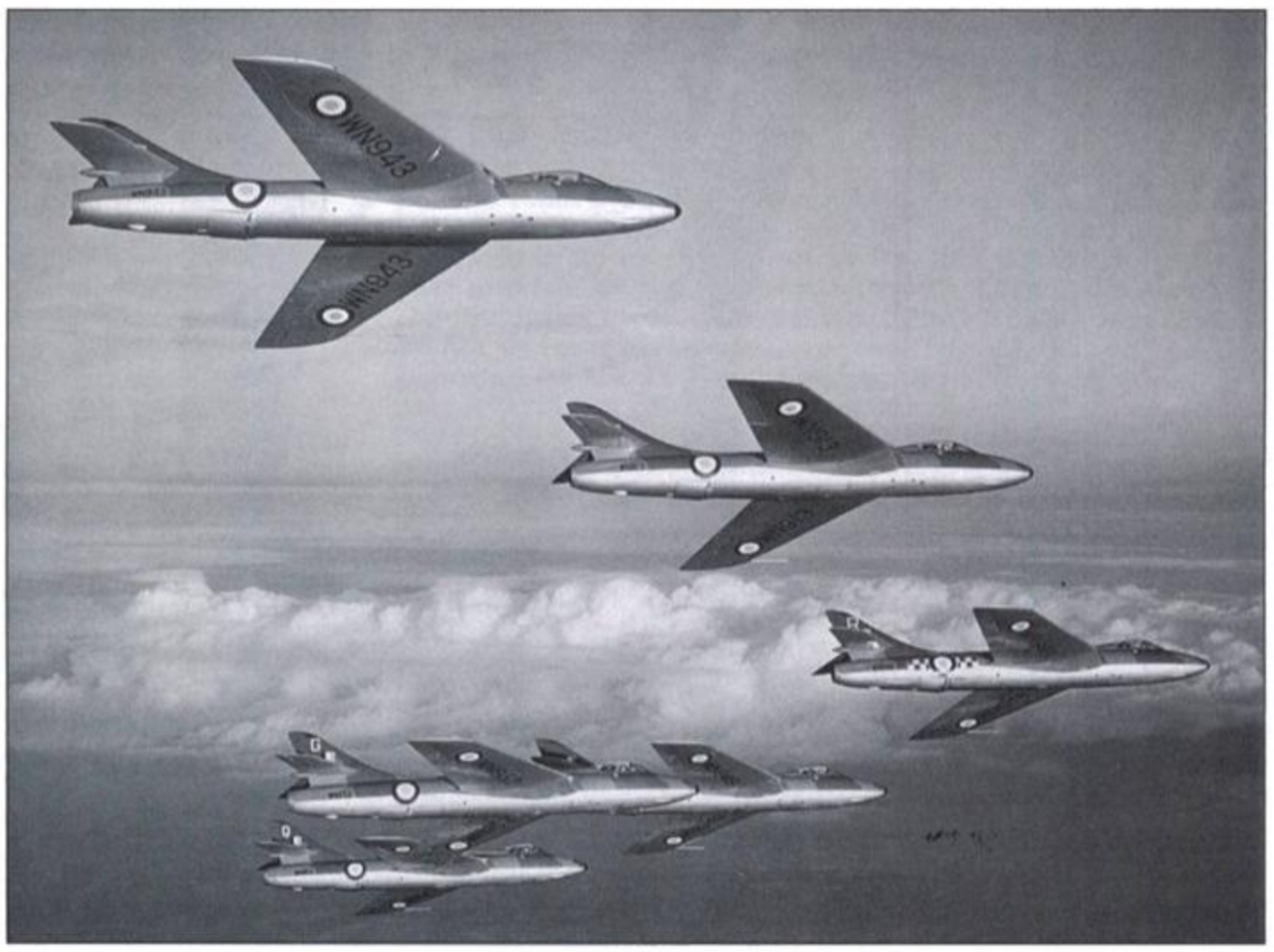
Built by Armstrong Whitworth, the F.Mk 2s comprised 45 aircraft serialled WN888/921 and WN943/953. No. 257 (Burma) Sqn took delivery of the first examples in September 1954. No. 257 was based at RAF Wattisham alongside the only other unit to fly the Mk 2, No. 263 Sqn, which received its aircraft in February 1955. Thus, by this time, the RAF had five Hunter squadrons on an operational footing but subject to a range of restrictions (mainly concerned with their armament) and hindered by inadequate endurance.

Above: WN888, the first production Hunter Mk 2, poses for an official manufacturer's photograph after completion. The Mk 2 was, outwardly, no different from a Mk 1.

Top and below: No. 257 Sqn flew Mk 2s for two and a half years before converting to the improved Hunter Mk 5. These aircraft carry the unit's green and yellow check markings.

replaced Trevor Wade as Hawker CTP after Wade was killed in the P.1081) took WB188 aloft for its maiden flight on 20 July 1951, Hawker had already received an order for an initial batch of 113 production aircraft, to be known as Hunter F.Mk 1s.

WB195 was the first 'fighter Hunter' and, although finished in the same duck-egg green as its sister, was fitted with an Avon 104, a working radar ranging gunsight, a four-ADEN cannon pack and the new tail bullet fairing, added to reduce transonic buffeting. The aircraft flew for the first time on 5 May 1952, and was fitted from the start with a 7,550-lb st (33.58-kN) production RA.7 Avon 104. Arguably the most significant of the prototypes was the third, WB202, which flew on 30 November 1952 powered by an Armstrong Siddeley Sa.6 Sapphire rated at 8,000 lb st (35.58 kN). Painted in Fighter Command's standard High Speed Silver finish, WB202 looked like a fighter, and was used for armament trials, including gun firing. With the tractable and tolerant Sapphire fitted, there were no problems, though the Avon-engined Hunter F.Mk 1 would always be subject to severe limitations when firing its guns.



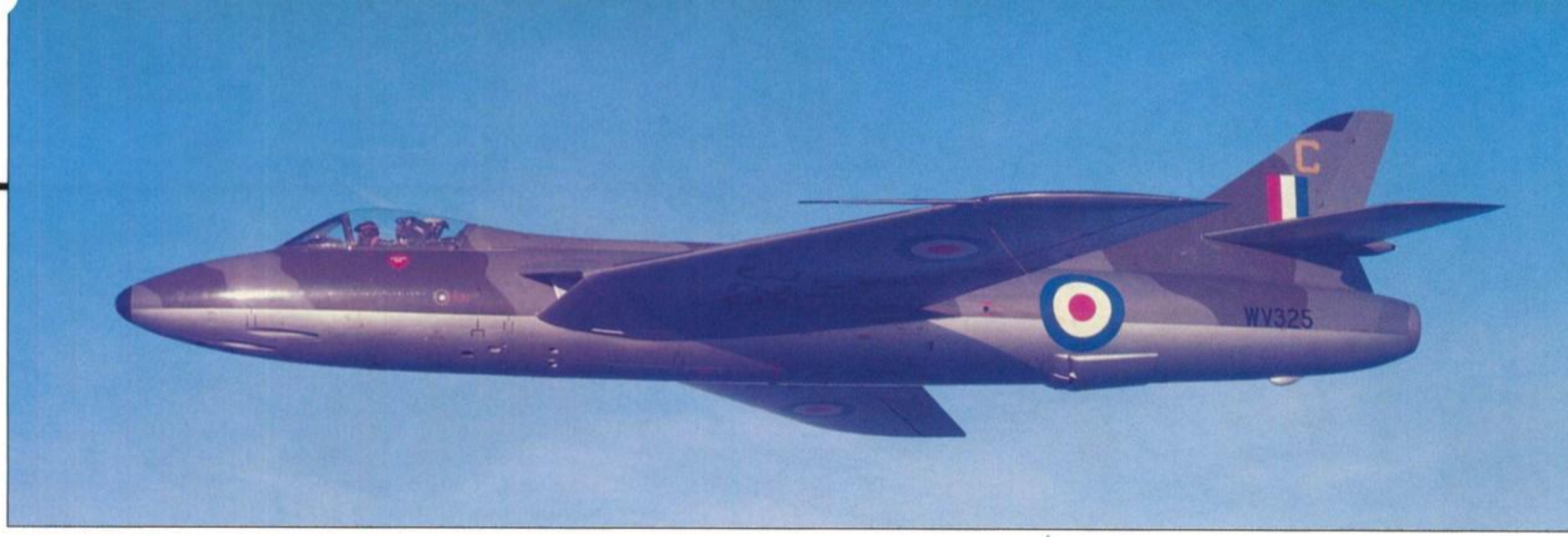
For all the P.1067's beauty and innovative features, the three prototypes were deeply flawed. The original specification had required inert gas purging of the fuel tanks, sun blinds for the pilot, and that no single bullet could lead to the loss of more than 20 per cent of fuel remaining. These key requirements were quietly ignored, as were the original range/endurance figures. The assumption that a 334-Imp gal (1518-litre) internal fuel capacity (with 80 Imp gal/364 litres required on rejoin) would be anything like adequate was, of course, ridiculous, while the reliance on the use of the split flaps as airbrakes gave inadequate deceleration, and led to a dangerous level of nose-down pitch in high-speed turns, especially at low level. The Avon engine was not well matched with the intakes, and proved prone to surging, especially under rapid acceleration or in high-*g* turns.

Ordered 'off the drawing board'

Nonetheless, production Hunter F.Mk 1s were ordered 'off the drawing board', before the prototypes had even flown, resulting in a batch of 20 or so aircraft which were unfit for service, but very useful to hasten the development effort. Some of these aircraft (e.g., WT573 and WT576) flew with the Avon 107 and with hot-air anti-icing in the intakes, while others tested the 7,600-lb st (33.80-kN) Avon 113 with increased nozzle guide vane area. This became the standard F.Mk 1 production engine.

The first operational test of the Hunter F.Mk 1 came during Exercise Dividend, in which a handful of early aircraft participated, flown by Central Fighter Establishment pilots. The exercise immediately revealed the need for some system to collect used ammunition links, which otherwise streamed back to damage the rear fuselage and tail. The exercise also highlighted the early Hunter's tendency to canopy misting and icing, which was so severe during the descent as to be dangerous. The early aircraft also lacked a powered all-flying tail, which was by then *de rigueur* on its American contemporaries. Of these faults, only the lack of an airbrake was remedied in the F.Mk 1, through the addition (from the 19th production aircraft) of a ventral airbrake – which looked like the clumsy afterthought it was, and which marked a stark contrast with the elegance of the rest of the design.

It was perhaps surprising that Hawker did not adopt the



airbrake installation already retrofitted to WB188. This aircraft had been rebuilt as the sole Hunter F.Mk 3 to undertake trials in support of the planned supersonic P.1083, and was used by Hawker to demonstrate that OR.228 performance shortfalls could be remedied. In fact, even the F.Mk 3 failed to meet the original rate of climb and time to height requirements, although it came close. Modifications to WB188 included the installation of an afterburning RA.7R (rated at 6,750 lb st/30.02 kN dry, and 9,500 lb st/42.25 kN with afterburning) and lateral airbrakes. The production P.1083 was due to add a new thinner wing (with a 6 per cent thickness:chord ratio, compared to the Hunter's 8.5 per cent) with 50° sweep, and was to be powered by an afterburning RA.19 (10,500 lb st/46.70 kN with afterburning). Integral fuel tanks in the wings were to double the aircraft's tankage, and it was expected to attain level speeds in excess of Mach 1.2. With a prototype under construction, the programme was cancelled in July 1953.

WB188 was further modified for record-breaking, with a sharp, conical nose fairing and a streamlined outer windscreen. The airbrakes were removed and skinned over for the record attempts. Neville Duke – who as a serving officer had been a member of the RAF's High Speed Flight – flew over the same Bognor-Littlehampton-Worthing course to set a new world speed record of 727.6 mph (1170.93 km/h). He did so on Sunday 7 September 1953 – Farnborough's press day.

The first production Hunter, WT555, had flown on 16 May 1953, and service handling trials continued throughout that summer. Various early aircraft were involved in the trials which eventually produced a definitive airbrake, although its position prevented its use during landing. Large numbers of F.Mk 1s and F.Mk 2s went straight into storage at Dunsfold, waiting for airbrakes to be fitted, but the first aircraft were delivered to the Central Fighter Establishment and No. 43 Squadron at Leuchars in July 1954. Operational experience soon demonstrated the Hunter's inadequate endurance, and revealed the alarming tendency of the engine to surge badly when the guns were fired. The temporary solution was to reduce fuel to the engine as the guns fired, leading to a huge loss of thrust, but still allowing the guns to be used. Even with this 'fix', however, the F.Mk 1 could not fire its guns above 250 kt (461 km/h) or 25,000 ft (7620 m).

The F.Mk 1s were built at Kingston and Blackpool, and Armstrong Whitworth at Baginton built the Sapphire-engined Hunter F.Mk 2s. The F.Mk 1s subsequently equipped No. 222 Squadron at Leuchars and No. 54 Squadron at Odiham, while F.Mk 2s went to Nos 257 and 263 at Wattisham. The F.Mk 2 proved faster than the F.Mk 1: 698 mph (1123 km/h) at sea level rather than 693 mph (1115 km/h), and Mach 0.94 rather than

Mk 4s for all

Modified with extra internal fuel capacity and the ability to carry a single 100-Imp gal (455-litre) drop tank under each wing, the 114th Hunter Mk 1 (WT701) effectively became the Mk 4 prototype. It was followed by a further 84 aircraft (WT702/723, WT734/780 and WT795/811) comprising the first batch of this mark, a second batch of 85 (WV253/281, WV314/334 and WV363/412) and a third order (WW589/591). All were built at Kingston and were followed by batches of 20 aircraft (WW646/665), 100 aircraft (XE657/689, XE702/718, XF289/324 and XF357/370) and 56 aircraft (XF932/XF953, XF967/XF999 and XG341/342) from the Blackpool factory. In March 1955 No. 54 Sqn received the first operational F.Mk 4s, No. 98 Sqn, 2nd TAF following suit in April.

Above: Coded 'C', Mk 4 WV325 spent its life with the Central Flying School and the Radar Research Establishment before a period in storage and its eventual sale to HSA for refurbishment (as a Jordanian FGA.Mk 73A). Here it is seen in 'as new' condition shortly after delivery. In their initial production form the Mk 4s were difficult to distinguish from earlier aircraft.

Above: 'Treble One' Sqn began its long and famous association with the Hunter in June 1955, when it traded its Meteor Mk 8s for Hunter Mk 4s. No. 111 soon became adept at formation aerobatics on the type; here four Kingston-built aircraft are seen prior to the establishment of the famous 'Black Arrows' display team. Note that two of the aircraft have been fitted with ammunition link collectors (nicknamed 'Sabrinas' after a generously proportioned celebrity of the day) which were retrofitted to many Mk 4s and some Hunters of earlier marks.

No. 66 Sqn was equipped with Meteor F.Mk 8s, Sabre F.Mk 4s and Hunter F.Mk 4s, examples of which are seen in this spring 1956 view, in succession between 1950 and 1956.

Though strictly a fighter in RAF service, a number of F.Mk 4s were test flown with air-to-ground stores. WT780 has been fitted with Mod 228 four-pylon wings and carries RPs and a 1,000-lb bomb.

Far right: No. 98 Sqn flew Mk 4s for just over two years, disbanding in the run-down of 2nd TAF Hunter units in 1957. WW658/'O' is typical of its equipment in 1955.

Below: No. 93 Sqn operated Hunter Mk 4s for two years, during which time a display team was formed and gave a number of performances during 1956/57. The trailing aircraft in this formation is of interest. WV318 was later converted to T.Mk 7B standard and upon retirement in the 1990s joined Delta Jets registered G-FFOX.

Mach 0.935 at 36,000 ft (10973 m). It also climbed faster. The Sapphire engine was virtually surge-free, allowing gun firing throughout most of the envelope, even at altitudes of 48,000 ft (14630 m) and at speeds of up to 550 kt (1014 km/h). The Sapphire was even more fuel efficient, although not enough to make the F.Mk 2 a sensible fighter aircraft, and this was why its production remained abbreviated.

The F.Mk 1 and the F.Mk 2 were fatally compromised by their lack of range and endurance, and were soon relegated to training duties with No. 229 OCU at Chivenor and No. 233 OCU at Pembrey. Not all the news was bad, though. Pilots loved the Hunters for their crisp handling characteristics, excellent visibility, comfort and sheer ruggedness. In the early years, many Hunter pilots survived mishaps in their Hunters. A DFLS pilot hit a tree while head-down map-reading, yet returned to base and landed safely. When two CFE Hunters collided in mid-air, one belly-landed safely and the other landed normally, although without its starboard tailplane and elevator. On one of the OCUs, a young pilot forgot to lower his landing gear, but overshot after touching down on his aircraft's belly, lowered the gear, and landed normally. Later, a Belgian Hunter landed itself after the pilot ejected following total engine failure.

The Hunter also had Martin-Baker's new fully automatic Mk 2H seat, giving better survivability in the event of a more serious incident. The Mk 2H seat could be used at heights as low as 400 ft (122 m), or 125 ft (38 m) when retrofitted with the Duplex drogue. One pilot survived after ejecting at an indicated air speed of 725 mph (1155 km/h) and an indicated Mach number of almost 1.1. This gave pilots tremendous confidence.

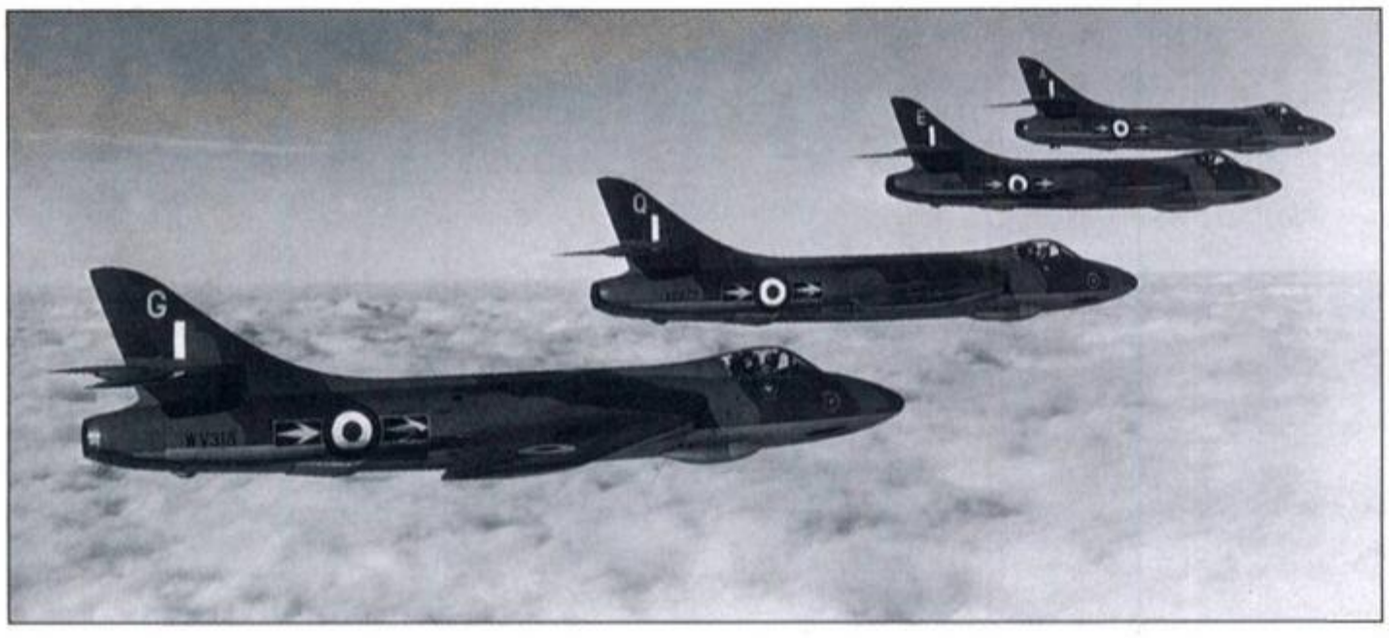
Finally, by comparison with its rival, the Supermarine Swift, even the Hunter F.Mk 1 looked like a success. The Swift was fractionally faster than the Hunter, and No. 56 Squadron gained its aircraft first, but the Swift proved to be a disaster in service. Engine surges and unreliability were mere irritations, but serious control problems, vicious pitch-up and 'runaway tailplanes' made the aircraft difficult to fly and easy to spin, and caused several fatal accidents. The Swift F.Mk 1 was withdrawn from use, but the F.Mk 2 proved no more successful, and neither did the F.Mk 4. The Swift was restricted to 520 kt (959 km/h) below 25,000 ft (7620 m), and 600 kt (1106 km/h) at higher altitudes, and was eventually withdrawn from use. No. 56 Squadron was forced to re-equip with ancient Meteor F.Mk 8s.

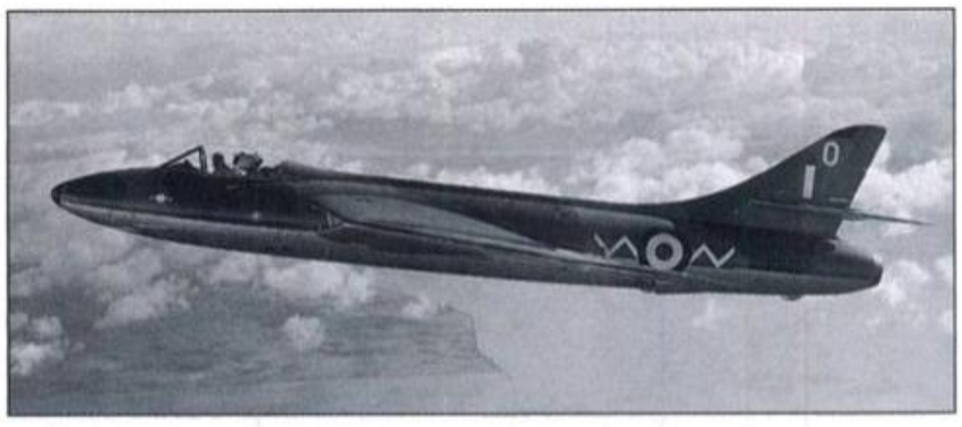
Practical fighters

Despite the limitations, the Hunter F.Mk 1 was not a bad aircraft for a pilot to fly while transitioning from Meteor F.Mk 8s, Vampires or Venoms onto the definitive Hunter F.Mk 4. It did, after all, have a swept wing, genuine transonic performance, and a modern cockpit. But the Hunter attained maturity with the F.Mk 4, which was the first truly operationally capable version.

From an early stage, it was clear that Hawker needed to address two major problems when it developed a new Hunter variant. The first, and most vital, need was to increase the aircraft's range and endurance by dramatically increasing fuel tankage. The second was to free the aircraft from the limitations imposed by the early engine's tendency to surge. Modifications were otherwise kept to a minimum, since the priority was to continue to build the aircraft in large numbers, and to continue re-equipping front-line squadrons. Disruption to the production line was to be avoided at all costs.

The resulting F.Mk 4 was thus a minimum change replacement for the F.Mk 1, externally indistinguishable from the earlier aircraft in most circumstances. The wing was redesigned to incorporate limited internal fuel tankage in eight small bags in the leading edge, and total internal fuel capacity was raised to 414 Imp gal (1882 litres), despite deletion of the rear fuselage tanks. The new wing was also given hardpoints and appropriate 'plumbing' to allow the carriage of a pair of 100-Imp gal (455-litre) drop tanks. The tanks were rarely carried in service, and using the new underwing pylons for air-to-ground weapons was demonstrated, trialled, proven and cleared, but never practised by front-line squadrons. The first F.Mk 4 was simply the 114th Hunter off the Kingston line (WT701),





2nd TAF/RAF Germany

Hunter Mk 4s entered service with 2nd TAF (RAF Germany from 1 January 1959) simultaneously with those in Fighter Command and were the first Hunters to see service in Germany. Nos 98 and 118 Sqns at Jever converted to the Hunter in April and May 1955, respectively, followed by Nos 4, 14, 26 and 20 Sqns over the next six months, replacing Sabres and Venoms.

Mark Fives

The Hunter Mk 5 was, to the Mk 2, what the Mk 4 was to the Mk 1 and incorporated the same improvements to fuel capacity. With no facilities for the maintenence of Sapphire-engined aircraft in Germany, the variant was largely confined to home-based units. Production was limited to 105 aircraft, all of which were constructed by Armstrong Whitworth and serialled WN954/992, WP101/150 and WP179/194. Like the Mk 4, the Mk 5 entered RAF service in 1955, serving Nos 56, 41, 1 and 34 Sqns. The last named pair (forming the Tangmere Wing) were posted to Akrotiri, Cyprus in 1956 to provide top cover for strike aircraft during Operation Musketeer.

and this aircraft, like the next 156, had the same Avon 113 (RA.7) engine as the F.Mk 1. Most of these aircraft went straight into storage, pending modification and re-engining.

The problem of surging was partially addressed on later F.Mk 4s, which introduced the more surge-resistant Avon 115 (RA.7), though the favoured fix to prevent engine surge during gun-firing was still to electrically dip the fuel and reduce flow to the engine. The final F.Mk 4s featured the Avon Mk 121 (RA.21).

In service, the Hunter F.Mk 4 never used the Mod 228 wing, with its extra pair of outboard hardpoints, and although the type was tested with a range of weapons (especially rockets) it remained a cannon-armed interceptor in RAF service. One modification added to many F.Mk 4s during the type's brief career was a pair of massive ammunition link collectors, large blisters which collected links as the guns were fired, preventing them from streaming back and causing damage to the rear fuselage or tail. Empty shell cases continued to be simply ejected overboard, but they were heavier and fell away more cleanly. The F.Mk 4 also introduced a gun bay purging system, with an air scoop which opened automatically when the guns were fired, ventilating the cannon pack and nosecone, preventing a build-up of potentially explosive gases. Modifications were also made to prevent cracking and damage when all four cannon were fired simultaneously.

Some Hunter F.Mk 4s were allocated to fighter squadrons in the UK (mainly ex-Meteor and -Hunter F.Mk 1 units), including Nos 43, 54, 66, 92, 111, 222, 245 and 247, but the bulk went to RAF Germany, replacing Sabres and Venoms with Nos 3, 4, 14, 20, 26, 67, 71, 93, 98, 112, 118, 130 and 234 Squadrons.

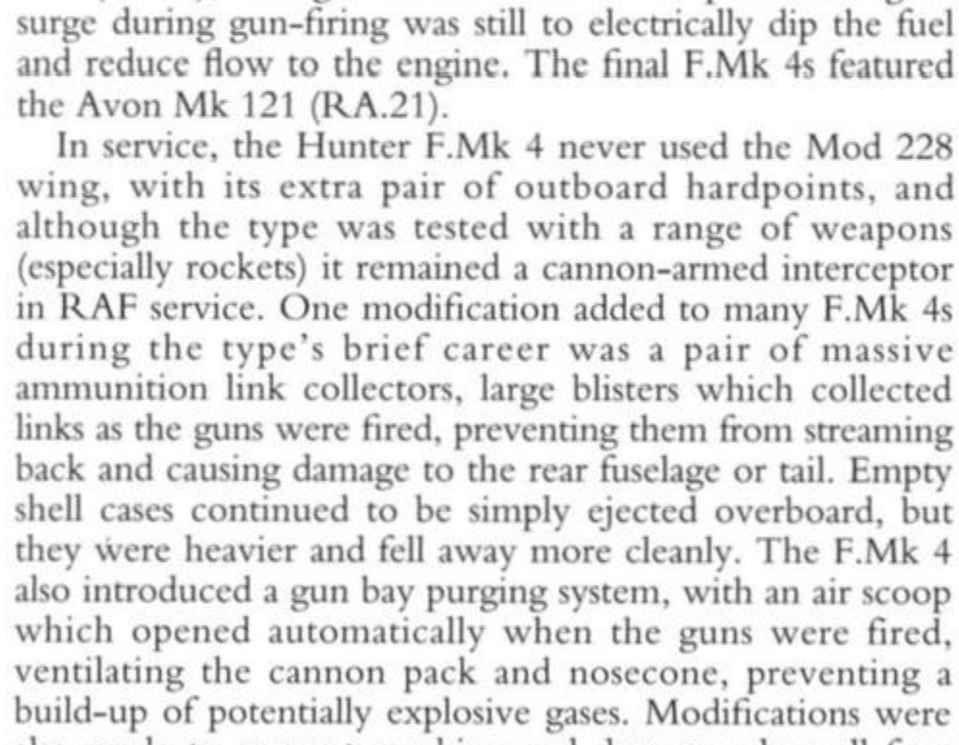
In RAF Germany, the Hunter F.Mk 4 completely replaced the Sabre, and re-equipped some of the Venom fighter-bomber squadrons. The Hunters formed wings of two or three squadrons, and each squadron at a particular airfield took it in turns to maintain a two-aircraft battle flight, ready to scramble at short notice, with the rest of the duty squadron at 15 minutes' readiness. Each Hunter wing in Germany had slightly different responsibilities. Brüggen and Geilenkirchen were charged with air defence of the Ruhr, while Jever and Oldenburg were assigned to air superiority over different parts of the North German Plain. In time of war, the Hunter squadrons would also have been expected to escort 2ATAF Canberras, carrying chaff in their airbrakes and flaps.

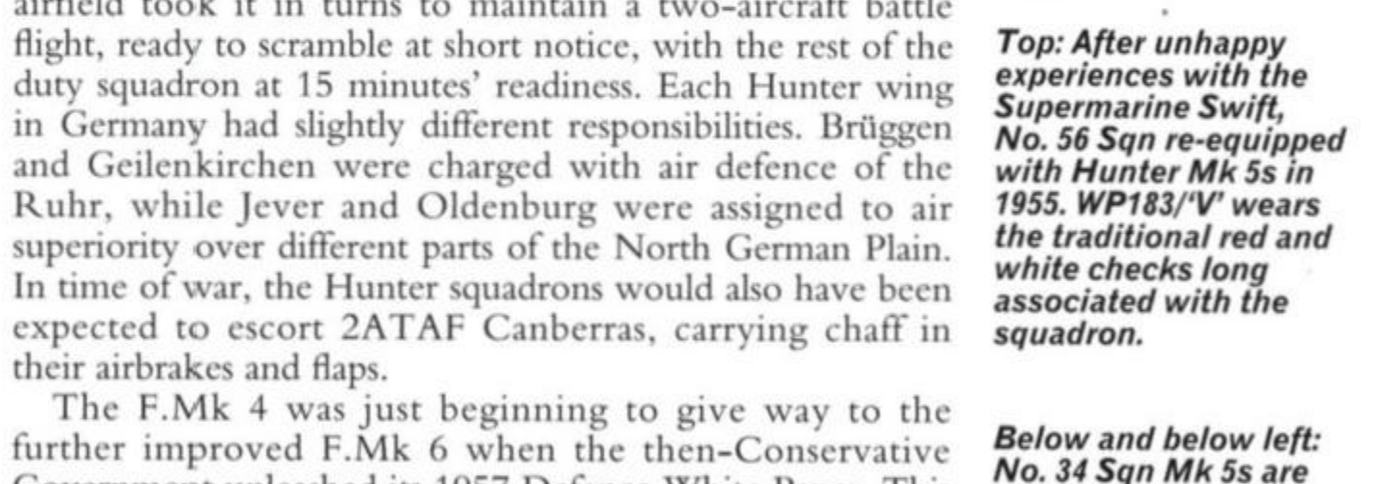
The F.Mk 4 was just beginning to give way to the further improved F.Mk 6 when the then-Conservative Government unleashed its 1957 Defence White Paper. This boldly predicted the end of the manned fighter, cancelled future developments and slashed existing programmes. Fighter Command and RAF Germany were reduced to shadows of their former selves, with the disbandment of large numbers of squadrons. Ten of the 18 front-line Fighter Command Hunter units vanished almost immediately. Nine of the 13 Hunter units in Germany also disappeared within the year. Before Duncan Sandys's White Paper, many had expected the Royal Auxiliary Air Force to take

Above: WN958 was the first Mk 5 employed for external stores trials at A&AEE Boscombe Down. It is seen here with a Mod 228 wing fitted and carrying 100-Imp gal (455-litre) 'bags' and unguided rockets.

Top: After unhappy experiences with the Supermarine Swift, No. 56 Sqn re-equipped with Hunter Mk 5s in 1955. WP183/'V' wears the traditional red and white checks long associated with the squadron.

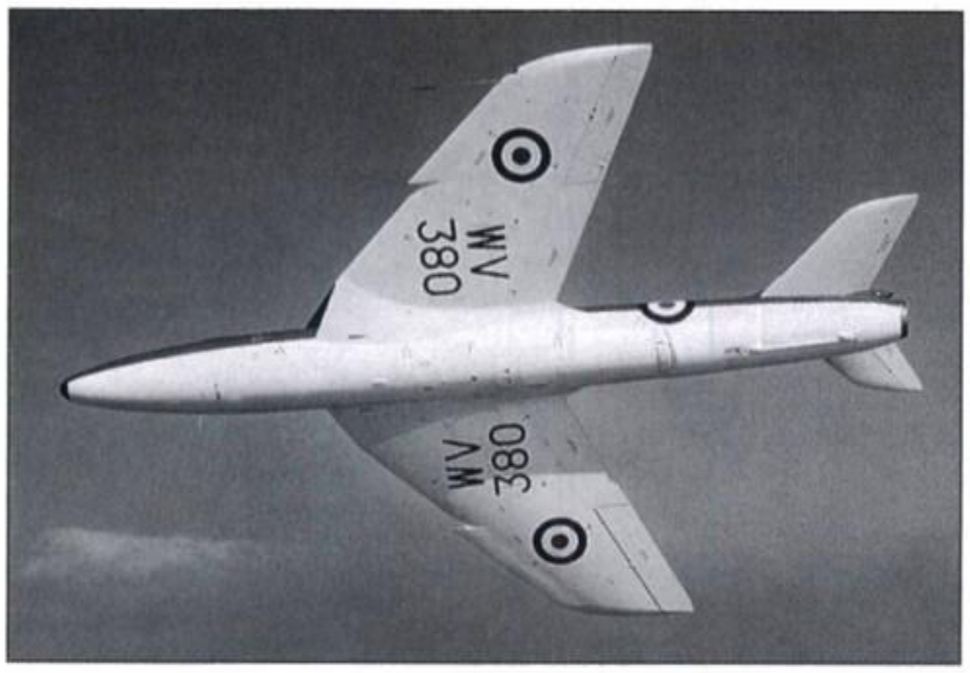
Below and below left: No. 34 Sqn Mk 5s are seen during operations from Cyprus during Operation Musketeer – the ill-fated Anglo-French operation to seize the Suez Canal, in conjunction with Isareli forces, during 1956. Note the yellow/black 'Suez stripes' applied to WP130/'S', taxiing at Nicosia.





Pristine GA.Mk 11 WV380, finished in the standard FAA Extra Dark Sea Grey/White scheme used on these aircraft until the mid-1980s, was photographed shortly after completion. Note the lack of armament, removed during conversion.

Right: Another view of WV380 shows the 'dogtooth' wing leading-edge extension and arrester hook fitted during Mk 11 conversion.



GA.Mk 11s for the RN

Converted from surplus RAF Hunter Mk 4s, the first of the FAA's 40 GA.Mk 11 tactical weapons trainers (XE712, an ex-No. 43 Sqn aircraft) entered service with No. 738 NAS in 1962.

over Hunter F.Mk 4s rendered surplus by the F.Mk 6, and some auxiliary pilots (notably as Biggin Hill and North Weald) had flown training sorties with co-located front-line Hunter squadrons, prior to official type conversion.

Gilding the lily

Although the Hunter F.Mk 2 never suffered from the engine surges which so hampered the F.Mk 1, the aircraft was almost as deficient in endurance and range. Thus, while there was no need to introduce a new engine, incorporating the Hunter F.Mk 4's extra fuel tankage in the Sapphire-powered version was thought to be worthwhile.

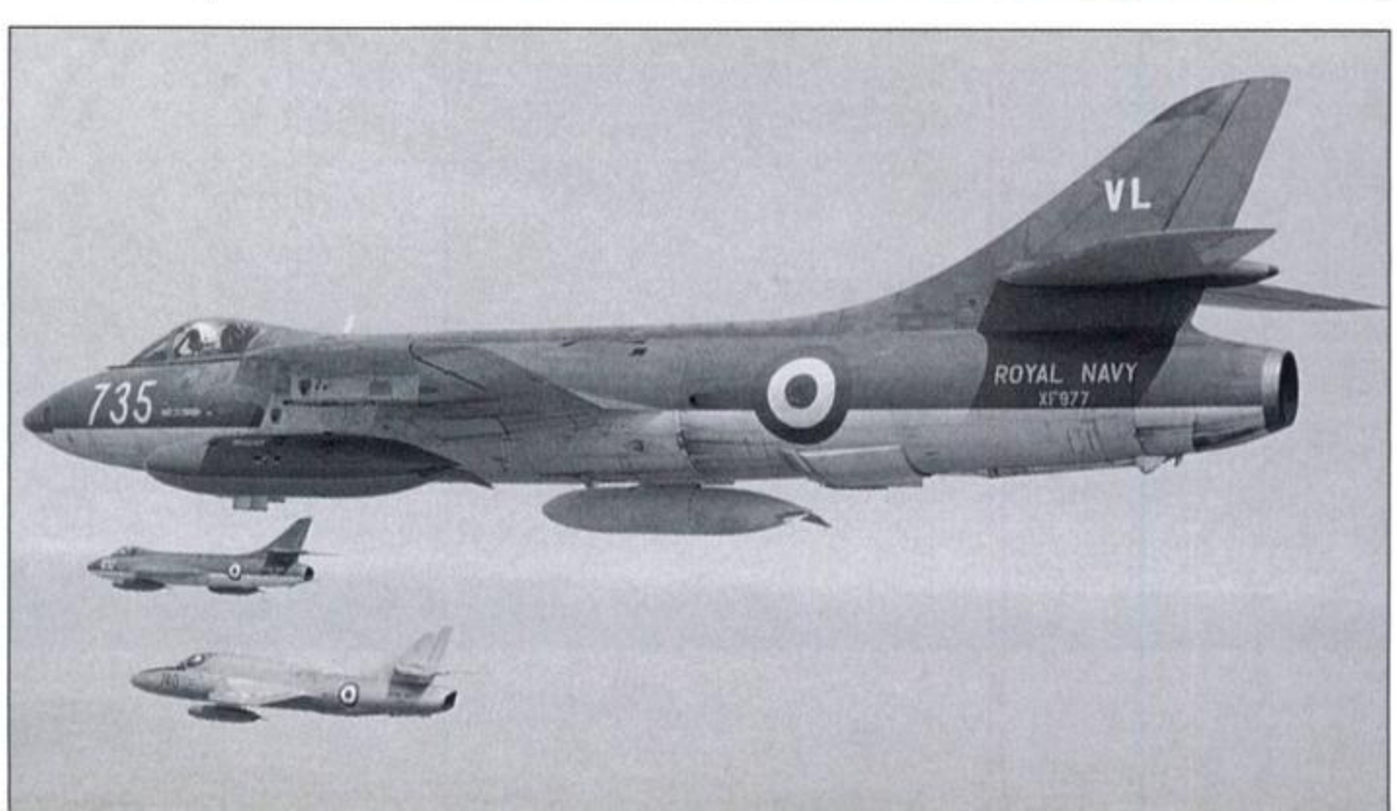
This resulted in the Hunter F.Mk 5, which re-equipped the cream of Fighter Command's home-based day fighter units from July 1955. The type served with Nos 1, 34, 41, 56, 257 and 263 Squadrons, equipping the wings at Tangmere, Waterbeach and Wattisham. The combination of the Sapphire engine and more fuel resulted in the best Hunter to date, with the best performance and the longest range. Unfortunately, though, insufficient F.Mk 5s were built, and its advantages were outweighed by the disadvantages of requiring a separate logistics and support infrastructure for what was a relatively small force. Although it had only a short service life, the F.Mk 5 was the first Hunter variant whose operational capabilities matched its handling qualities.

It was thus appropriate that the Tangmere Wing (Nos 1 and 34 Squadrons) flew the first operational missions in the Hunter F.Mk 5 during Operation Musketeer, the ill-starred Franco-British intervention at Suez. The 24 Hunters deployed initially flew air defence missions, protecting the vital Cyprus airfields against anticipated Egyptian attacks. When these failed to materialise, the Hunters flew a range of fighter sweeps (as far south as Cairo) and escort missions. A handful of Hunter F.Mk 4s of No. 111 Squadron flew air defence missions over Malta.

The Hunter was built very much as a modular aircraft, and major sections could easily be replaced. Later, this made refurbishing and rebuilding attractive options, and meant that elderly airframes remained attractive prospects for rebuild and conversion. Remarkably, however, no one seems to have suggested rewinging the F.Mk 1s and F.Mk 2s with the later F.Mk 4 wing, so the aircraft were simply scrapped or retired to ground instructional duties, some having flown only a handful of hours. When the F.Mk 4 and F.Mk 5 began to fade from the scene, the value of a Hunter airframe was still not fully appreciated, and again some aircraft were scrapped or relegated to ground training. Others did go on to serve in other roles and other guises.

Lower right: WT809, one of the GA.Mk 11s fitted with a Harley Light (for use in the target facilities role), is a Fleet Requirements and Air Direction Unit aircraft operating from Yeovilton.

Below: This RNAS Lossiemouth-based No. 764 NAS machine (XF977, the youngest of the Mk 4/Mk 11 conversions) is one of the handful completed to PR.Mk 11 standard with a camera nose. Note also that it carries two pylons under its port wing, indicating that it is one of the 16 aircraft fitted with a Mod 228 wing.



Refurbished Hunter F.Mk 4s

Some 40 surplus F.Mk 4s were converted to meet the Royal Navy's requirement for a tactical weapons training aircraft, under the designation GA.Mk 11, for a reported unit cost to the Admiralty of only £33,000. The best, lowest-houred F.Mk 4s were selected for conversion and refurbishment at Kingston. Two standards of GA.Mk 11 shared a common designation, since some 16 of the 40 aircraft were fitted with the four-pylon Mod 228 wing. Conversion to GA.Mk 11 standards entailed a full refurbishment, together with the installation of an emergency airfield arrester hook, TACAN, and F.Mk 6-type dogtooth leading edges. The aircraft also had their ADEN cannon packs removed, the gun ports were faired over, and the radar ranging gunsight was removed. Although strafing was not a priority in Fleet Air Arm ground attack training, the Hunters were wired to carry a variety of weapons, including the Martin Bullpup ASM (used by front-line Scimitars) and the AIM-9 Sidewinder, though these weapons were not used by service GA.Mk 11s. The standard RA.7 engine was retained for maximum compatibility with the

Navy's T.Mk 8 trainers. Some GA.Mk 11s were fitted with a Harley light (to aid optical tracking when operating in the target facilities role) and others with an FR.Mk 10-type camera nose. With the latter fitted, the designation PR.Mk 11 was sometimes used.

The first GA.Mk 11 flew on 24 January 1962, and the aircraft subsequently equipped Nos 738 and 764 Squadrons, but not No. 759 Squadron which provided Part I of the RN Advanced Flying Training Course, using only T.Mk 8s. The squadron basically took pilots trained by the RAF on the Jet Provost and gave them an equivalent to the RAF's Advanced Gnat course. Students then went to No. 849 for Gannet AEW conversion, or to No. 738 Squadron for Part II of the course, learning weapons release techniques and fighter ground attack tactics. No. 738 Squadron formed an aerobatic team, the 'Rough Diamonds'. No. 764 Squadron provided refresher courses for squadron commanders and senior pilots, and for air warfare instructors. The Hunters were phased out of service in the training role between 1969 and 1972, passing to the Fleet Requirements Unit at Hurn. With FRADU at Yeovilton, GA.Mk 11s served until 1995.

Two-seat trainer

The Hunter F.Mk 4 – rather than the later, improved F.Mk 6 – formed the basis of the two-seat Hunter trainer, the even longer-serving T.Mk 7. The Hunter T.Mk 7 has enjoyed an extraordinarily long career, and has become one of the most commonly seen British military aircraft, although remarkably few were built. Britain's first jet fighters all entered service without dedicated two-seat trainer variants (much like the RAF's high-performance, piston-engined fighters including the Hurricane, Spitfire, Typhoon and Tempest). There had been no two-seat Venom or Sabre trainers, and the Hunter was expected to present no more difficulties than its forerunners. Plenty of redundant Vampire FB.Mk 5s and Meteor F.Mk 8s were available on which tyro fighter pilots could hone their skills, while advanced training had been conducted on the Meteor T.Mk 7s of the AFSs since 1950, and on the Vampire T.Mk 11 since 1953. All-through jet training on the Vampire T.Mk 11 began in 1954, with a Jet Provost/Vampire sequence from 1955. A two-seat training variant of the Hunter was not perceived to be necessary, and the priority was to build as many single-seaters as possible, in order to re-equip the front line. Thus, the Hunter F.Mk 1 entered service in May 1954, but it was to be more than four years (virtually an aircraft type's normal lifetime, in those days) before the T.Mk 7 followed suit.

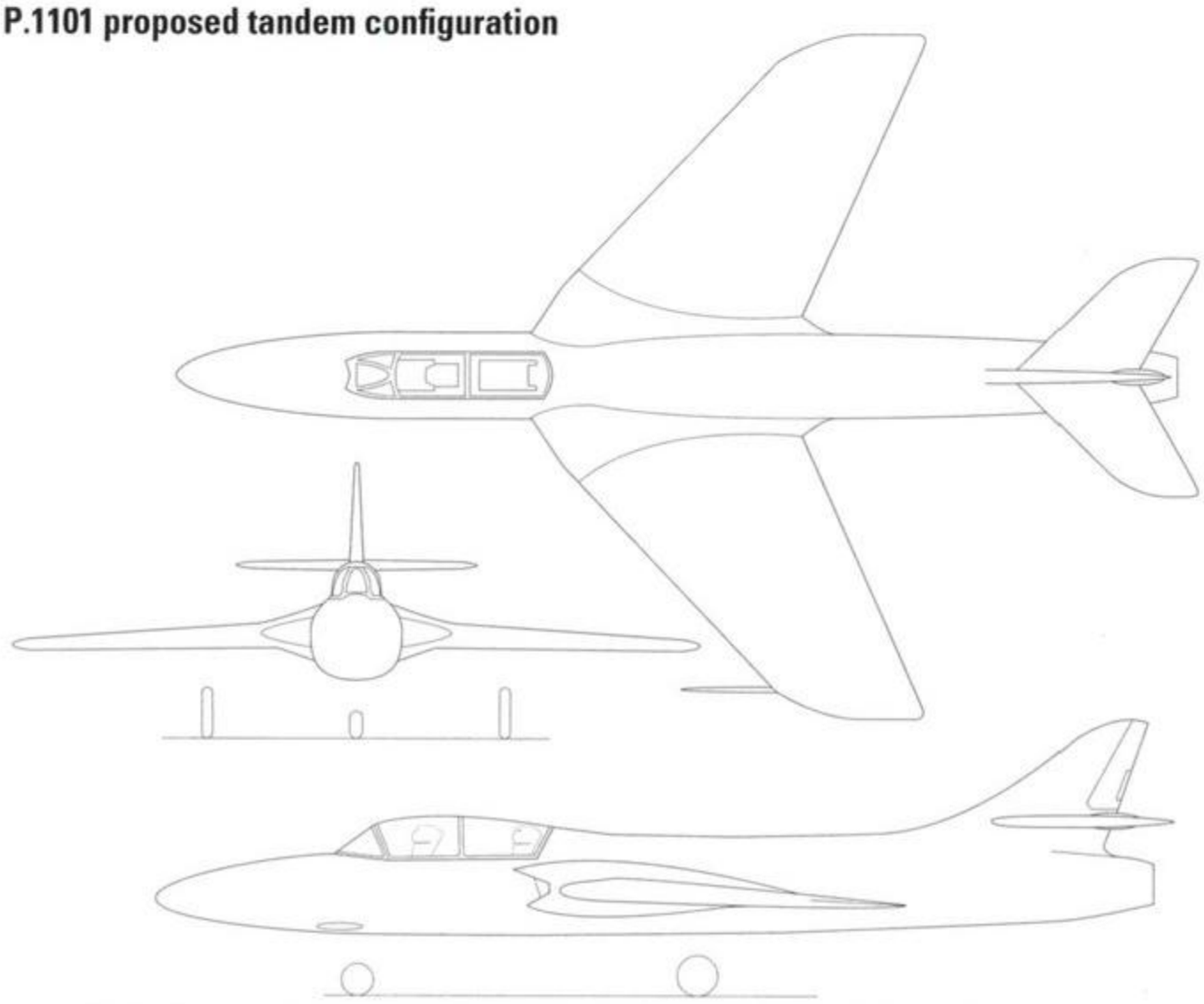
Hawker began development of a two-seat Hunter trainer (as the P.1101) as a private venture principally for export, and an RAF Specification (T.157D) was written around the

Above: Operated from RNAS Yeovilton by Flight Refuelling Ltd from 1983, these Harley Light-fitted GA.Mk 11s are seen in typical FRADU configuration, carrying a pair of 100-Imp gal (455-litre) 'bags'.

Left: Air Warfare Instructor training was one of the major tasks performed by No. 764 NAS from the late 1950s. Here '693/LM' lets fly with half a dozen rockets. GA.Mk 11s were wired to carry a variety of weapons, including Bullpup ASMs.

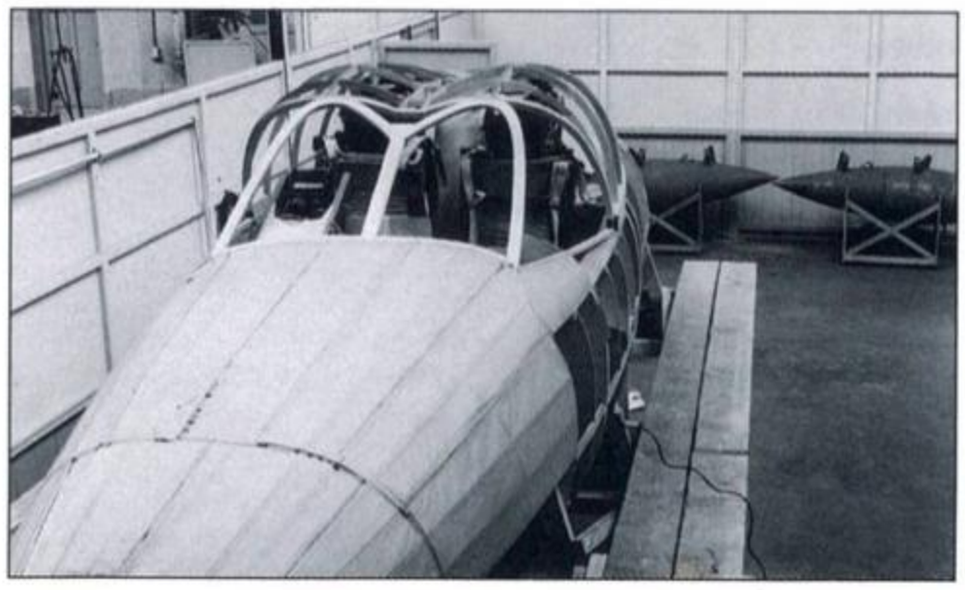
Below: As originally designed the canopy for the two-seat Hunter was of a 'double bubble' type, seen here in wooden mock-up form in March 1955.

P.1101 proposed tandem configuration

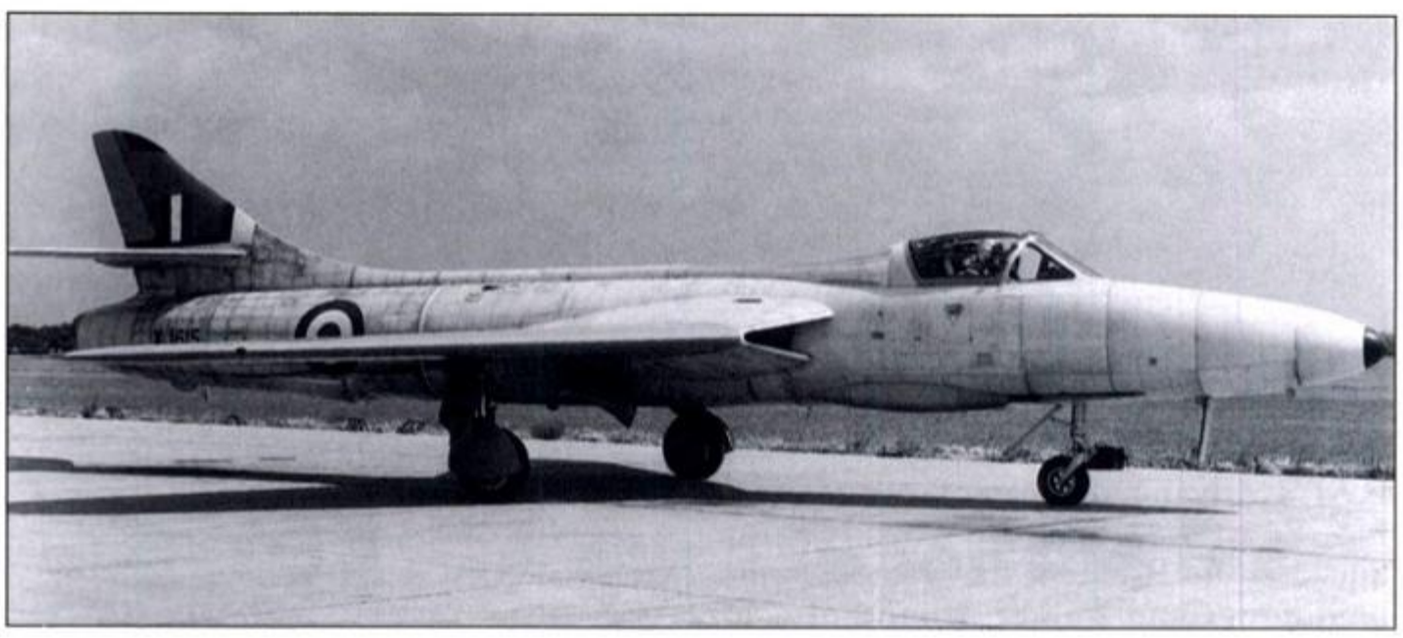


'T-bird' – P.1101/Mk 7

Recognising that the RAF was likely to require an aircraft with which to replace its long-in-the-tooth Meteor and Vampire trainers, Hawker initiated the design of a two-seat Hunter as a private venture with its export potential also firmly in mind. Two prototypes (XJ615 and XJ627) were followed by 45 new-built aircraft (XL563/579, XL583, XL586/587, XL591/597, XL600/601, XL605, XL609/623) for the RAF. (Fifty-five had been ordered, but 10 were transferred to the Fleet Air Arm as T.Mk 8s.) A further batch of 10 (XM117/126) was cancelled and became part of an order for 20 T.Mk 7s placed by the KLu. Six F.Mk 4s were also brought up to T.Mk 7 standard for the RAF.



Hawker Hunter



Above: After wind tunnel testing threw up airflow problems, the 'double bubble' canopy gave way to this more 'smoothed out' contour. It was with this canopy design that XJ615 made its first flight.

Above right: Buffeting caused by airflow breakdown around the hood led to the testing of various combinations of vortex generators around the windscreen frame, visible in this view of the first prototype.

Right: Once it was realised that it was the shape of the canopy that was the root of the P.1101's problem, various new profiles were tested. Metal panels were used during development, as a cost-saving measure. The contour shown here was close to the final roof fairing shape.

aircraft. The inadequacy of the Hunter F.Mk 1 had led to its early relegation to training duties, and the type's usefulness with No. 229 OCU and No. 233 OCU indicated that a two-seat Hunter might find a useful role with these units, and perhaps with front-line squadrons. The new T.Mk 7 was never seen as an advanced trainer in its own right, and RAF orders for the type were disappointingly small.

Side-by-side configuration

The Hunter trainer followed contemporary fashion in having a two-seat, side-by-side cockpit. This layout had been adopted by the Vampire, Provost and Jet Provost. Tandem seating was associated with the older Meteor T.Mk 7 and with the anachronistic Tiger Moth and Chipmunk. The side-by-side cockpit was justified by its ease of communication between student and instructor, and by the superior weapon aiming it offered the instructor, but, in truth, fashion had probably the greater influence on RAF thinking. Hawker was more open-minded, and studied tandem and side-by-side configurations, the tandem configurations requiring additional tailfin area. Within a few years, the wheel had turned full circle, and the lower-drag tandem cockpit was thought to be the way of the future.

Hawker redesigned the forward fuselage of the Hunter, producing a broad, blunt nose section with a wide cockpit tub covered by a canopy which initially consisted (on the mock-up) of two single-seat bubbles faired together, with a distinct dip or crease along the centreline. This was clearly nonsense from a production engineering point of view, and was revised into a single, flatter-topped unit before the prototype was built. The aircraft was based on the airframe of the then-current (but rapidly disappearing) F.Mk 4, with the small-bore Avon 100 series engine and the original straight-edged wing, to ensure that conversion of redundant F.Mk 4s to T.Mk 7 standards would be as easy as possible.

The P.1101 prototype (XJ615) first flew on 8 July 1955. It originally had a small spine, and a step between it and the rear edge of the big twin-cockpit canopy made it appear that the canopy was intended to slide backwards for access, like the canopy of the single-seater. In fact, the two-seat canopy was always intended to open upwards and backwards, electrically, the step being the result of an initial decision that single- and two-seaters should be identical aft of the front transport joint. From Mach 0.84 the canopy generated powerful vortices which created alarming levels of noise and drag, and which caused snaking and pitching at speeds above Mach 0.88. Hawker tried to smooth out the airflow by adding vortex generators to the canopy frame, but they were ineffective. A variety of spine-to-canopy fairings was then tried, but a complete redesign was necessary, according to the principles of Whitcomb's Area Rule. The canopy was raised at the rear, with a much larger spine extending further aft, before fairing into the spine. Some of the 24 to 28 new hood and spine configurations tested on the P.1101 prototype were simple metal shapes, before the final configuration was tested with a metal fairing and a conventional Plexiglas canopy. The entire process led to a 12-month slippage in the T.Mk 7's ISD.

From 1956, the T.Mk 7 began flying with a 10-ft 6-in (3.2-m) diameter GQ brake parachute. This was initially trialled on an F.Mk 4 in a bullet-type fairing above the jet-pipe, and later in a compartment in the upper surface of the jet pipe fairing, which was extended further aft, giving a slight 'pen-nib' appearance. This installation was adopted on XJ615, and on all subsequent T.Mk 7s and other two-

Though based on the Mk 4, production T.Mk 7s shared the F.Mk 6's 'dog tooth' wing and were armed with a single ADEN cannon.

Above: First flown on 17 November 1956, XJ627 was the second P.1101 prototype and, unlike the first aircraft, was based on the Avon 200-engined F.Mk 6. The RAF hoped that production aircraft would be built to this standard, with the 'big bore' engine, but the impending surplus of redundant Mk 4s meant that the T.Mk 7 would be a 'small bore' aircraft. Here XJ627 is seen in the blue/white colour scheme applied after a spell with A&AEE.

*In 1965 Hawker received an order for the fitting of **TACAN** navigation equipment and servo-operated **IFIS** instruments in seven T.Mk 7s and a single T.Mk 8. All were to be redesignated T.Mk 7A for use by the RAF. However, halfway through the work the contract was cancelled and only four were completed, including XL616, seen here in the markings of No. 208 Sqn during the 1980s.*

Left: At least one Mk 7, WV318, was retrofitted with equipment to T.Mk 7A standard, and is seen here with a No. XV Sqn Buccaneer from Laarbruch during the 1970s. Such aircraft may have carried an unofficial 'T.Mk 7B' designation.

seat variants. Production T.Mk 7s had the F.Mk 6-style dogtooth wing, though this was not fitted to the prototype.

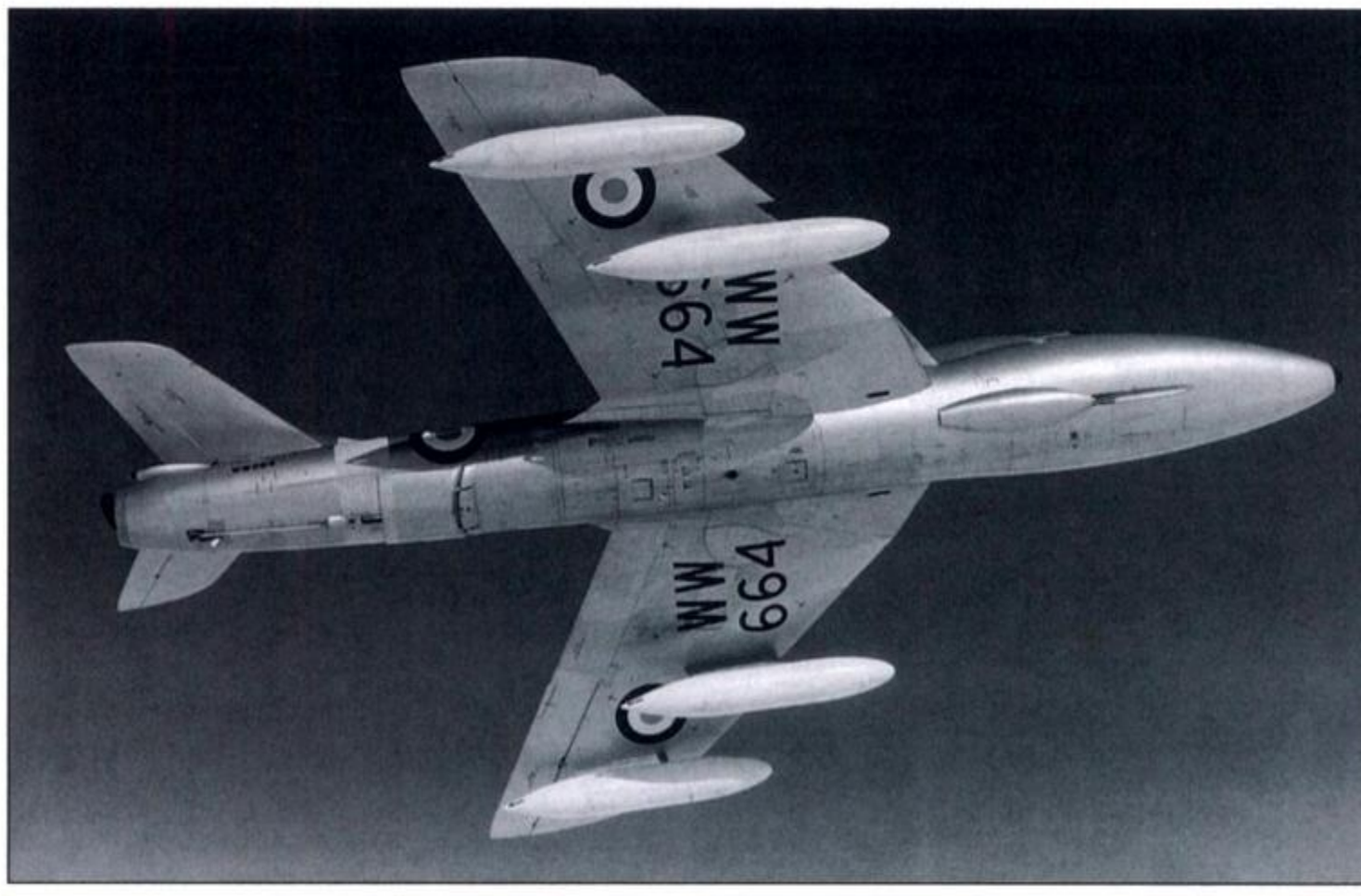
Hawker received a contract for the construction of 55 production T.Mk 7s to be manufactured at Blackpool, powered by RA.21 Avon 121A or 122 engines, the initial 65-aircraft order being reduced by the reallocation of XM117 to XM126 to the Netherlands. Ten aircraft were also reassigned to the FAA as T.Mk 8s, leaving 45 T.Mk 7s for the RAF. After trials with the prototype, the armament on the production version was reduced to a single cannon offset to starboard, with a newly designed blast deflector. Cutbacks in F.Mk 6 production led to sufficient capacity being made available at Kingston for T.Mk 7 production. T.Mk 7s entered service with No. 229 OCU at Chivenor in May 1958 and about 12 were in use by the end of the year. A number of front-line Fighter Command Hunter squadrons then began receiving single T.Mk 7s, some eventually having two on charge. More new-build two-seaters went to the Netherlands (10 aircraft, in addition to the 10 diversions), Denmark (two aircraft), and India (22 Avon 200 series-engined, two-gun aircraft).

Additional two-seat trainers were produced through conversion of single-seaters. The RAF received six F.Mk 4-based T.Mk 7s (and not the 28 extra conversions quoted in some books on the Hunter), while the Fleet Air Arm gained 31 more T.Mk 8s (of various sub-types) converted from F.Mk 4s. The RAF and Royal Navy Hunters were produced in a bewildering plethora of sub-variants. The basic T.Mk 7 was a simple trainer, but four aircraft (XL568, XL611, XL614 and XL616) were converted as T.Mk 7As, with OR946 servo-operated IFIS (Integrated Flight Instrumentation System) instruments, like those used in the new generation of combat aircraft such as the Buccaneer and Lightning. Initially used for trials, the aircraft were soon used for training Buccaneer aircrew, who had no two-seat Buccaneer on which to train. At least one more aircraft (WV318) was subsequently brought up to the same standards, reportedly under the (perhaps unofficial) designation T.Mk 7B. The basic T.Mk 8 for the Royal Navy was virtually identical to the RAF T.Mk 7, featuring an emergency airfield arrester hook but lacking a radio compass and DME.

Subsequent Royal Navy trainers were designated T.Mk 8B and T.Mk 8C, with TACAN (both types), IFIS instruments and airflow detection device (T.Mk 8B only), and gun and ranging radar removed (T.Mk 8B). Some had a Harley light fitted in the nose. Three aircraft were later fitted with Sea Harrier Blue Fox radar for trials (T.Mk 8M), two of which were subsequently used by No. 899 Squadron (the Sea Harrier training unit) for radar training for Sea Harrier pilots. As if this were not confusing enough, some T.Mk 8s were fitted with T.Mk 7 back ends, without arrester hooks, while some T.Mk 7s gained hooks, with no change in designation.

A second P.1101 prototype was built, based on the F.Mk 6 engine and wings. The F.Mk 6 was by then the standard production single-seater, and an F.Mk 6-based twin-sticker was thought to offer the greatest export potential. Eventually this supposition proved correct, although early Hunter customers (like the Netherlands, Denmark and Peru) used F.Mk 4-based two-seaters. India was the first operator to order two-seaters based on XJ627,

WW664 was a Hunter F.Mk 4 serving with No. 26 Sqn, RAF when it crashed on 28 July 1956. Returned to Dunsfold for repair it was instead converted as the T.Mk 8 prototype, flying as such on 3 March 1958. Note that the aircraft has been fitted with a Mod 228 wing, a 'dog tooth' leading edge and an arrester hook.



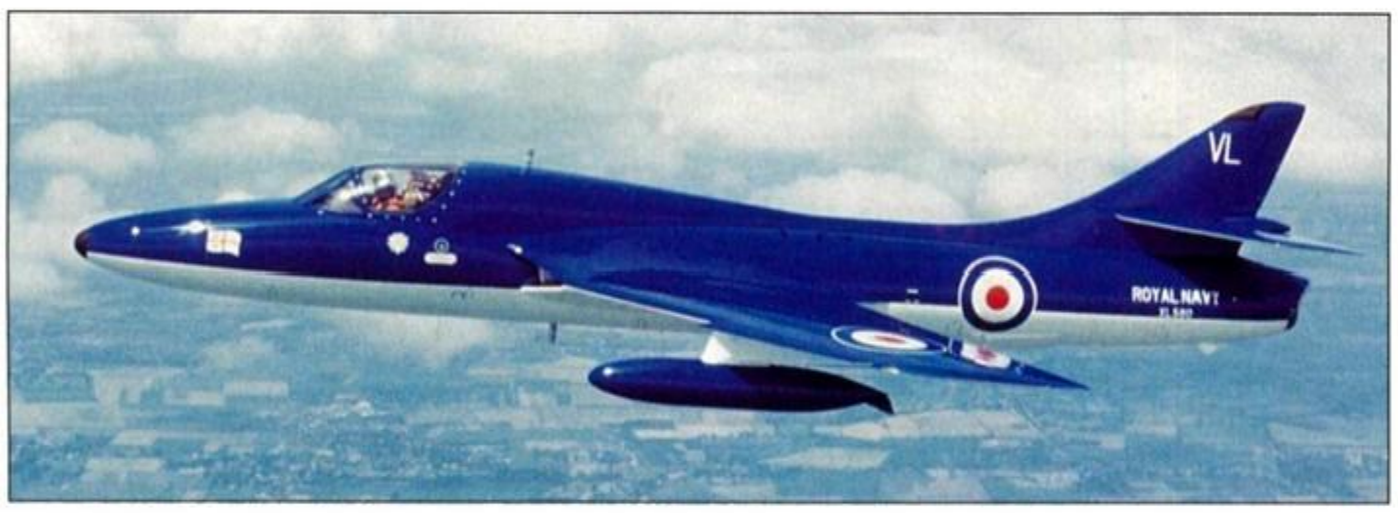
Naval T.Mk 8s

As new transonic fighters like the de Havilland Sea Vixen and Supermarine Scimitar entered service, the FAA expressed interest in a naval vesion of the RAF's Hunter T.Mk 7 to replace its two-seat Sea Furies and Vampires. So it was that 10 Mk 7s were taken from the batch of 55 ordered by the RAF and 'navalised' as Mk 8s. These aircraft were XL580/582, XL584/585, XL598/599 and XL602/604. Mk 8 development work had been carried out on a converted ex-RAF F.Mk 4 (WW664) and this was followed by three conversion orders for 17 T.Mk 8s, three T.Mk 8Bs and 10 T.Mk 8Cs, all based on ex-RAF F.Mk 4s. Hunter Mk 8s were issued principally to Nos 736 and 764 Naval Air Squadrons for operational conversion and instructor training.

Hunter

Based at Hurn, the Airwork-operated FRU received its first Hunter Mk 8s in 1969, moving to Yeovilton in 1972 as the FRADU. This FRADU T.Mk 8C (one of the batch converted from ex-RAF F.Mk 4s) is finished in the eye-catching post-1969 T.Mk 8 colour scheme.

Below: Also based at Yeovilton were the three aircraft of No. 764 NAS's Flag Officer Flying Training (FOFT). Known as the 'Admiral's Barges' XL580 (the first production Mk 8), XL584 and XE665 (a converted Mk 4) were specially prepared by Hawker Aircraft with 100-Imp gal (455-litre) drop tanks and a new glossy blue/white colour scheme incorporating a Rear Admiral's pennant.



Below: XL580 later became one of the three T.Mk 8Ms converted for Blue Fox radar training (with XL602 and XL603). Here it flies with a Sea Harrier FRS.Mk 1 and Harrier T.Mk 4N, all three aircraft marked as members of No. 899 NAS, the Sea Harrier Training Sqn. Note the Sidewinder AAM acquisition round on the Hunter's wing pylon.

the second P.1101. These had twin cannon armament and 10,000-lb st (44.48-kN) or 10,050-lb st (44.70-kN) RA.28 Avon 203 or 207 engines. After India ordered its two-seat Hunters in two-gun, Avon 200-engined form, Hawker then produced a similarly configured demonstrator using a spare two-seat nose and components from two crashed Belgian F.Mk 6s. Subsequently, most Hunter customers ordered such two-seaters, many converted from redundant single-seaters. In addition to the 65 new-build T.Mk 7s and T.Mk 8s delivered to the RAF and RN (and the two prototypes), Kingston built 10 two-seaters for the Netherlands, two for Denmark, one for Jordan and 22 for India. All other two-seaters were either second-hand or converted from single-seat airframes, usually with the big 200-series engine.

A single Avon 203-engined Hunter two-seater (the sole T.Mk 12) was built for the British MoD, converted from an FGA.Mk 9. Intended for TSR.2 trials support, the aircraft had modern HUDs and a large vertical camera in a slightly bulged nose. Cancellation of the TSR.2 meant the aircraft was relegated to more general trials use by the RAE.

Many who have written about the Hunter have close and strong links with Hawker, and have loudly condemned the RAF's decision to procure the Gnat as a Vampire T.Mk 11 replacement in the advanced training role and to use the Hunter T.Mk 7 only for continuation and conversion training on Hunter squadrons, as a weapons trainer and to augment Gnats when more training capacity was required. In fact, the T.Mk 7 was never available in sufficient numbers to be much more than a check-out aircraft at both No. 4 FTS and with No. 229 OCU and the TWUs, students flying most solo exercises in the single-seat F.Mk 6 or FGA.Mk 9. The underpowered T.Mk 7 was unpopular with many students, who disliked having an instructor beside them, disliked the heavily framed canopy, and preferred the solo feeling of a tandem cockpit arrangement. The Hunter T.Mk 7 was more popular with instructors, since it offered them a better forward view than the cramped and low rear seat of the Gnat, and a much better view of what the student was doing.

The T.Mk 7 did have its advantages, since it was rugged, forgiving, extremely serviceable and easy to fly. For students progressing to the Hunter-equipped No. 229 OCU, the TWUs or even to a front-line Hunter squadron, the aircraft was also a logical and sensible training aircraft, but then so would a Lightning T.Mk 5 have been for someone going to the Lightning. The Hunter did enjoy an excellent thrust-to-weight ratio in its training configuration, and was far better at altitude than the Gnat, though never as fast in the dive and never as agile. At low level, the two aircraft had very similar performance characteristics. The Hunter was also an excellent training aircraft for test pilots, and remains one of the few swept-wing aircraft cleared for deliberate spinning. This clearance resulted from work carried out by Hawker following the loss of two aircraft in inverted spinning incidents, though the clearance was never extended to service Hunter T.Mk 7s.

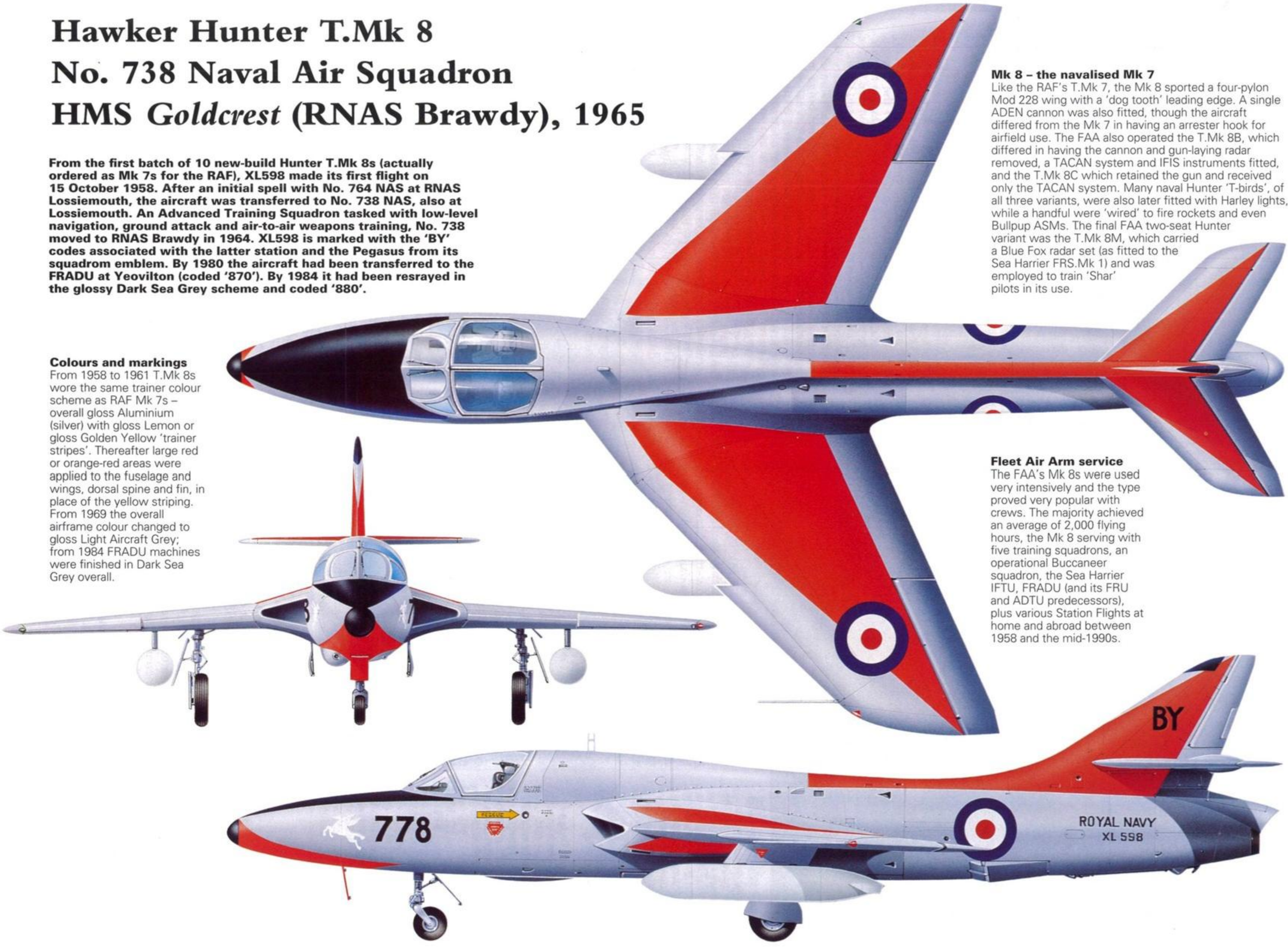
Hawker Hunter T.Mk 8
No. 738 Naval Air Squadron
HMS *Goldcrest* (RNAS Brawdy), 1965

From the first batch of 10 new-build Hunter T.Mk 8s (actually ordered as Mk 7s for the RAF), XL598 made its first flight on 15 October 1958. After an initial spell with No. 764 NAS at RNAS Lossiemouth, the aircraft was transferred to No. 738 NAS, also at Lossiemouth. An Advanced Training Squadron tasked with low-level navigation, ground attack and air-to-air weapons training, No. 738 moved to RNAS Brawdy in 1964. XL598 is marked with the 'BY' codes associated with the latter station and the Pegasus from its squadron emblem. By 1980 the aircraft had been transferred to the FRADU at Yeovilton (coded '870'). By 1984 it had been resrayed in the glossy Dark Sea Grey scheme and coded '880'.

Colours and markings
From 1958 to 1961 T.Mk 8s wore the same trainer colour scheme as RAF Mk 7s – overall gloss Aluminium (silver) with gloss Lemon or gloss Golden Yellow 'trainer stripes'. Thereafter large red or orange-red areas were applied to the fuselage and wings, dorsal spine and fin, in place of the yellow striping. From 1969 the overall airframe colour changed to gloss Light Aircraft Grey; from 1984 FRADU machines were finished in Dark Sea Grey overall.

Mk 8 – the navalised Mk 7
Like the RAF's T.Mk 7, the Mk 8 sported a four-pylon Mod 228 wing with a 'dog tooth' leading edge. A single ADEN cannon was also fitted, though the aircraft differed from the Mk 7 in having an arrester hook for airfield use. The FAA also operated the T.Mk 8B, which differed in having the cannon and gun-laying radar removed, a TACAN system and IFIS instruments fitted, and the T.Mk 8C which retained the gun and received only the TACAN system. Many naval Hunter 'T-birds', of all three variants, were also later fitted with Harley lights, while a handful were 'wired' to fire rockets and even Bullpup ASMs. The final FAA two-seat Hunter variant was the T.Mk 8M, which carried a Blue Fox radar set (as fitted to the Sea Harrier FRS.Mk 1) and was employed to train 'Shar' pilots in its use.

Fleet Air Arm service
The FAA's Mk 8s were used very intensively and the type proved very popular with crews. The majority achieved an average of 2,000 flying hours, the Mk 8 serving with five training squadrons, an operational Buccaneer squadron, the Sea Harrier IFTU, FRADU (and its FRU and ADTU predecessors), plus various Station Flights at home and abroad between 1958 and the mid-1990s.



Mk 12 – TSR.2 test bed

Notable as the sole Avon 200-powered two-seat Hunter purchased by the British Ministry of Defence, T.Mk 12 XE531 was converted from an FGA.Mk 9 (itself rebuilt from an F.Mk 6 that had been bailed to Rolls-Royce at Hucknall for tropical trials) and was one of the few Hunters to never see squadron service. Chosen by the RAE to test a selection of the avionics destined for the TSR.2 strike aircraft, the Mk 9 was converted to Mk 12 standard and delivered to Farnborough in February 1963. Among the equipment fitted was a Specto Avionics HUD, the installation of which caused a distinct bulge in the top surface of the aircraft's nose. With the cancellation of TSR.2, the Mk 12 was used for general trials work, and was flown with an early 'fly-by-wire' control system.

Above: XE531 wore this pleasing green/white colour scheme with the RAE badge below the cockpit. The missing bulge in the nose of the aircraft suggests that this photograph was taken after the cancellation of TSR.2. The aircraft was wrecked in a take-off accident at Farnborough on 17 March 1982.

Top: Here the bulge in the nose of the aircraft, caused by the HUD installation, is evident. A pair of 230-Imp gal (1046-litre) drop tanks appears to have been a routine load for the aircraft.

In the 1960s, the Gnat was a better advanced trainer generally than the Hunter T.Mk 7. Its complicated and sometimes troublesome systems aped those of the latest front-line jets, and its narrow-track, crosswind-intolerant landing gear and sometimes dangerous swept-wing handling characteristics made it an ideal training medium for pilots destined for aircraft like the Lightning. The Gnat was light and sensitive on the controls – demanding a sensitive hand – and its low wing loading and huge ailerons made it extremely agile. Many felt that the Hunter was easy to fly, but that the Gnat was (to those skilled enough to appreciate it) more fun, and more representative of the high-workload cockpits of the latest fighters. Even if the two-seat Hunter was not the best possible advanced trainer, it was hugely successful as a trainer on Hunter squadrons, and performed the weapons/tactical training task with competence.

A number of attempts were made to design front-line combat types based on the two-seat Hunter, mainly radar-equipped, missile-armed all-weather fighter versions. The P.1130 was equipped with AI.23 and Firestreak missiles, and was offered to India after British interest narrowed to the Javelin and Lightning for the RAF's all-weather fighter force. The P.1114 and P.1115 were earlier two-seat, all-weather fighters, featuring wingtip fuel tanks and Avon and Sapphire engines, respectively. The P.1128 was a business jet, having side-by-side seating for the two-man crew and seats behind for six passengers. This version was planned around a pair of side-by-side Bristol Orpheus engines.

Exports – the small-bore F.Mk 4s

The Hunter's early export successes were all the result of American policy, sometimes deliberate, sometimes inadvertent. The intensification of the Cold War led to US worries that some of its European allies were inadequately equipped to meet the threat posed by aircraft like the MiG-15. The failings of Australian Meteor F.Mk 8s had been amply demonstrated over Korea, and the US decided that it would contribute towards the replacement of such outdated aircraft in NATO air forces. Remarkably, because of the urgency of the task, the US decided to fund the acquisition of new combat aircraft not only by delivering US-built types at 'knock down' prices, but also by paying for European nations to receive European-built aircraft types. A US team visited Britain to evaluate the Swift and the Hunter, and decided that the Hunter qualified for so-called 'Offshore Procurement' funding. As a result, some RAF F.Mk 4s and a number of the F.Mk 4s built under licence by Belgium (the first 64) and the Netherlands (the first 48) were paid for by Uncle Sam.

The US attempted to dampen tensions in South America by discouraging an arms race, and backed this up with a policy under which modern combat aircraft would not be exported to the region. Britain took advantage of this high-minded policy to export Canberras, Meteors, Vampires and Venoms to a number of countries. Peru was one of the first South American countries to receive US-built combat aircraft, gaining F-86 Sabres in 1955. Despite this, the country chose to acquire Hunters for its fighter force, and purchased 16 ex-RAF F.Mk 4s, which were delivered by sea in May 1956.

The only other customer for the Hunter F.Mk 4 was Denmark, which ordered 30 new-build aircraft in July 1954. They were destined to serve until March 1974, when the surviving aircraft were repurchased by Hawker Siddeley.

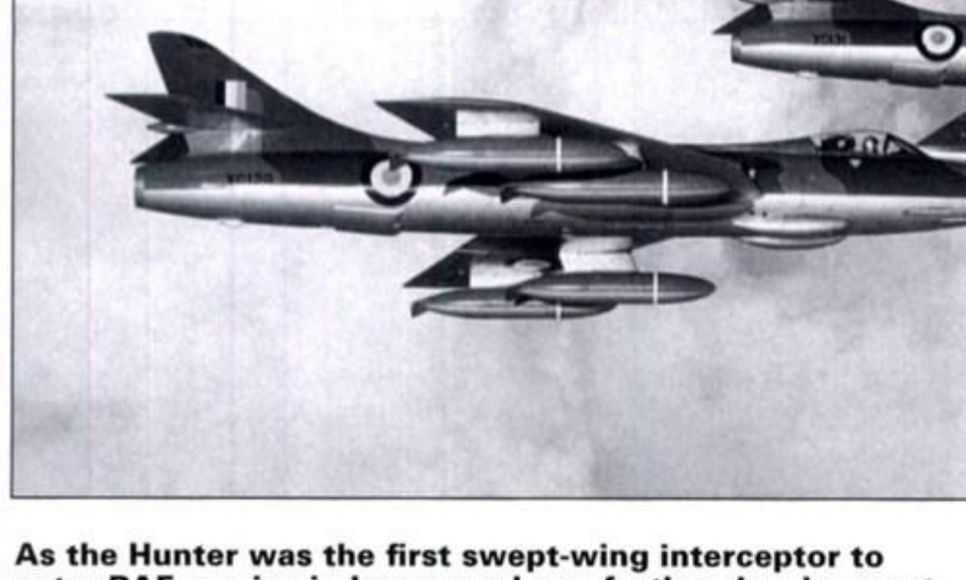
The big-bore Hunters

Even in its F.Mk 4 form, the Hunter was a severely restricted aircraft, which failed to fully exploit the design's considerable potential. The aircraft remained deficient in range, and its performance fell far short of what had been specified in the original requirement which had created the Hunter. To Rolls-Royce's embarrassment, the aircraft remained inferior to the 'insurance policy' Sapphire-engined versions. Rolls-Royce Avons powered the Canberra, the Comet and the planned P.Mk 1 Lightning, and its Sapphire was in use on the Mk 1 Victor, and the Javelin. Getting the engine right on the Hunter was a priority for Rolls-Royce, which aimed for the Avon to become the standard RAF tactical military turbojet engine.

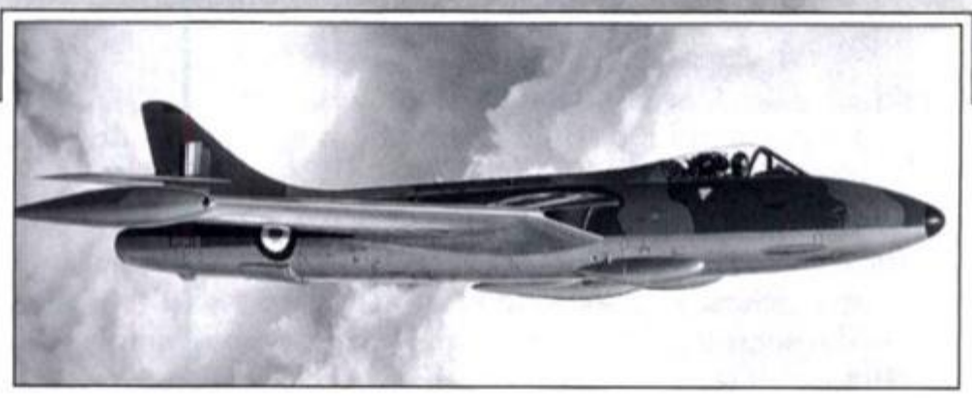
One solution to remedy the Hunter's performance shortfall was through brute force and a major redesign. The planned P.1083 had a thin (6 per cent thickness:chord ratio), 50-degree swept wing and an afterburning RA.19R rated at 12,500 lb st (55.60 kN). The aircraft promised Mach 1.2 performance (Mach 1.08 at sea level), and a time to its 55,000-ft (16764-m) ceiling of only 5 minutes and 12 seconds. The aircraft would have been superior to the F-100, but was abandoned in favour of the crescent-winged Supermarine 545 as the prototype (WN470) was taking

Hunter trials aircraft

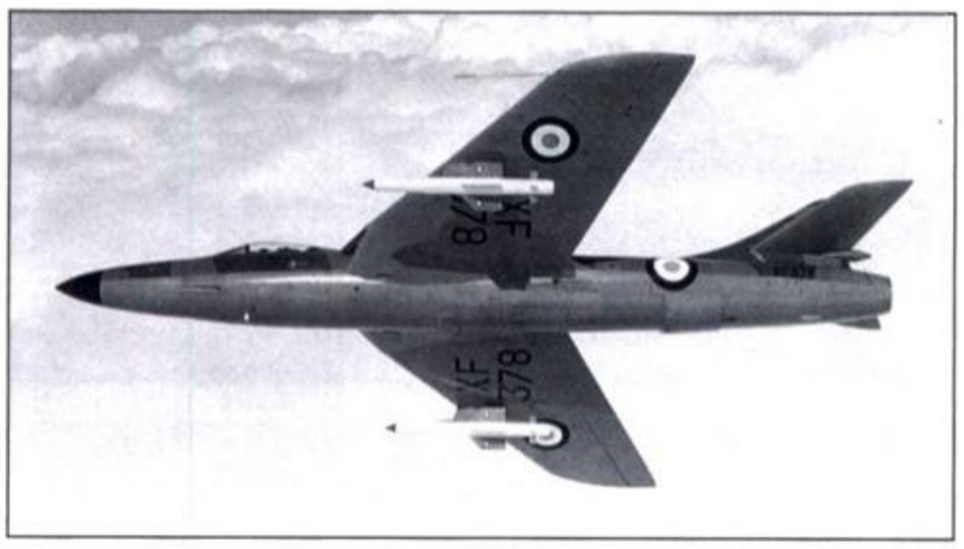
As the Hunter was the first swept-wing interceptor to enter RAF service in large numbers, further development of its airframe, armament and general capabilities necessitated the use of a number of Hunter airframes by both test establishments and service units. While some aircraft were employed exclusively as test airframes, others were only operated for short periods and were later returned to standard configuration and delivered to service squadrons. While some of the features tested were adopted in production Hunters, others (especially some weapons) were not adopted. Others saw use in RAF aircraft other than the Hunter.



One of the Blackpool-built batch of F.Mk 4s, XF310 was, for almost three years, engaged in Fairey Blue Sky (Fireflash) AAM trials. Modified by Fairey in July 1956, the aircraft sported a lengthened nose housing fire-control radar. Most test firings were made at the RAE's Llanbedr range before joining five other Mk 4s in being converted to T.Mk 7 standard in 1959. Later modified as a T.Mk 8C, the aircraft was sold in Australia upon its retirement.



Left: Hunter Mk 6 XG131 was employed by Hawker as a test bed for a wing-tip tank installation. This allowed the underwing pylons to be used exclusively for weapons carriage. Though displayed at the 1956 SBAC show, the tiptank was not adopted as it produced buffeting. the aircraft was later returned to standard configuration and delivered to the RAF.



Left and lower left: The third production F.Mk 6, WW594, was employed as an aerodynamic testbed for the AI.Mk 20 radar installation for the projected de Havilland Blue Jay (Firestreak) AAM. Designated P.1109A by Hawker, it was followed by P.1109B, F.Mk 6 XF378. This aircraft was fitted with a full AI.Mk 20 set and undertook Firestreak firing trials from Llanbedr in 1957, operating over the Aberporth Sea Range.

shape. A P.1091 was briefly considered, with a Sapphire 4 engine and a Delta wing; however, a missile-armed supersonic interceptor was considered to be only a few years away, and any advanced Hunter came to be viewed as only an interim fighter, with a longer term future in the fighter-bomber role where very high speeds and rate of climb were less important.

With the abandonment of these 'Super Hunters', Hawker began work on a more modestly modified Hunter version, using the centre and forward fuselage and tail unit of the cancelled P.1083 in the construction of the first P.1099, XF383, the prototype F.Mk 6. This new Hunter fighter variant was powered by the new 200 Series Avon. This remarkable engine was produced by faithfully reproducing the first four stages of the rival Sapphire's compressor, with a newly designed set of 11 stages behind it.

That should have been the end of the story, had Rolls-Royce found any luck at all. In fact, early 200 Series Avons were as plagued by surging as the original Hunter Avons, until a new automatic fuel system and more flexible throttle control system were introduced. These improvements finally rendered the Hunter F.Mk 6's Avon 203 immune to surging (though still not as tolerant to throttle mishandling as the Sapphire), while also giving about 30 per cent greater thrust. This meant that Fighter Command finally had an Avon-powered Hunter that could fire its guns without restriction and had a performance which more closely matched the original requirement.

The F.Mk 6 even had more fuel, giving the aircraft a more useful range and radius of action. The small centre fuselage tanks of the F.Mk 4 were removed and replaced by two 25-Imp gal (114-litre) bag tanks adjacent to the jet

First exports

With, in some cases, support from Her Majesty's Government (and, in others, despite its interference) Hawker Aircraft cultivated a highly successful export trade in the Hunter. While the bulk was to comprise refurbished aircraft, the first aircraft sold abroad were built to order or diverted from RAF contracts. Beginning in 1954, Sweden, Denmark and Peru were the first recipients of 'foreign' Hunters, while the Netherlands and Belgium (as NATO members) undertook licensed production with American funding. Also in 1954, India expressed interest in no fewer than 100 aircraft, while Switzerland signed for a similar number in 1958. Iraq and Lebanon received small numbers of ex-RAF machines during 1958.

A contract for the supply of Sweden's 120 Hunter Mk 50s, valued at £25 million, was signed in June 1954. All but the first 24 aircraft (built at Kingston) were constructed at the Blackpool factory to Mk 4 standard with Avon 100 engines. The Mk 50 (J34 in Flygvapen service) was fitted with the Mod 228 wing which, though it lacked the 'dog tooth' leading edge was later modified to carry Sidewinder AAMs, as seen on J34 'B' of F18. Note also the link collectors and gun blast deflectors, retrofitted after delivery.

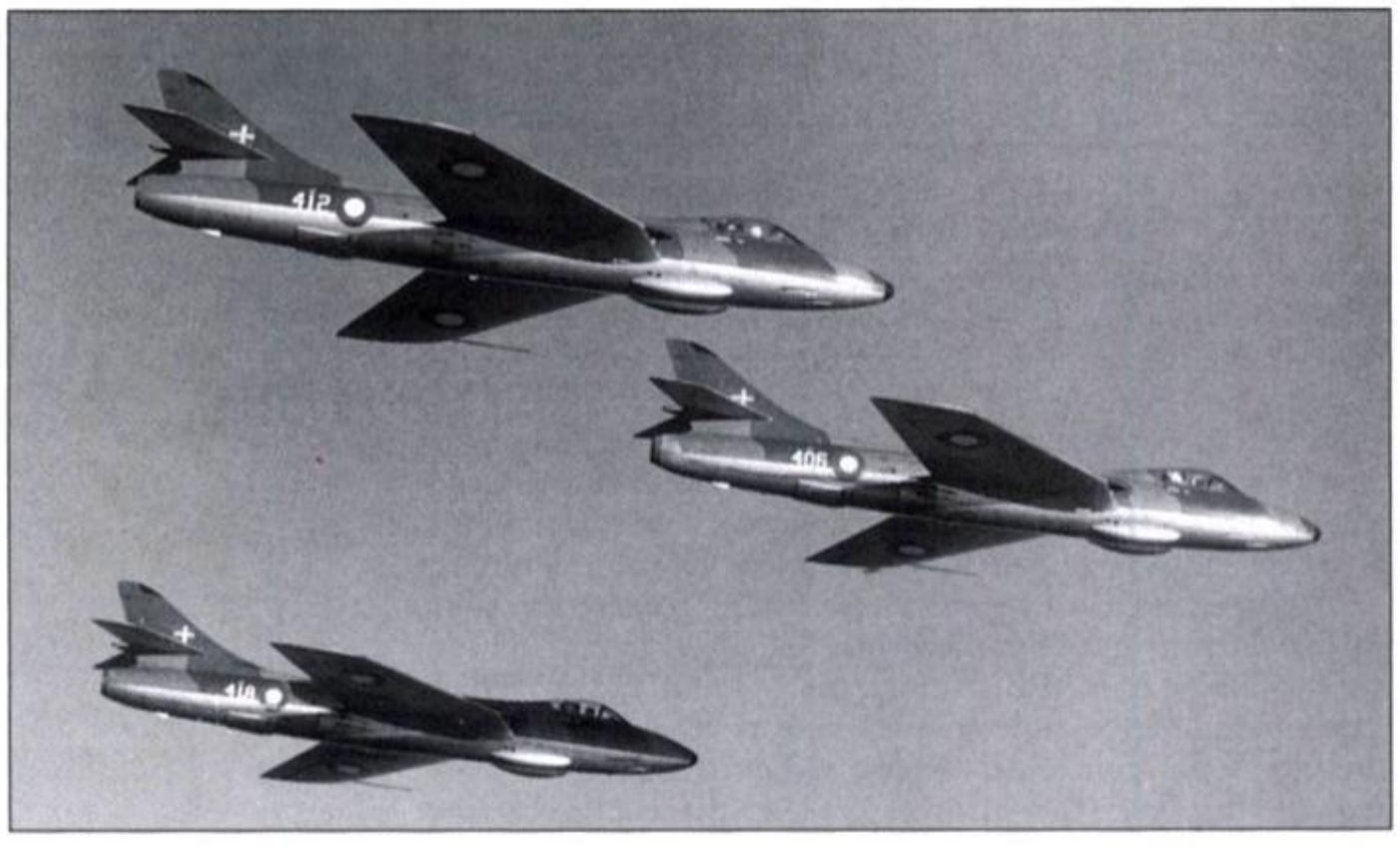
Far right: In 1962 F18 formed the 'Acro Hunters' display team, seen here executing a formation loop.

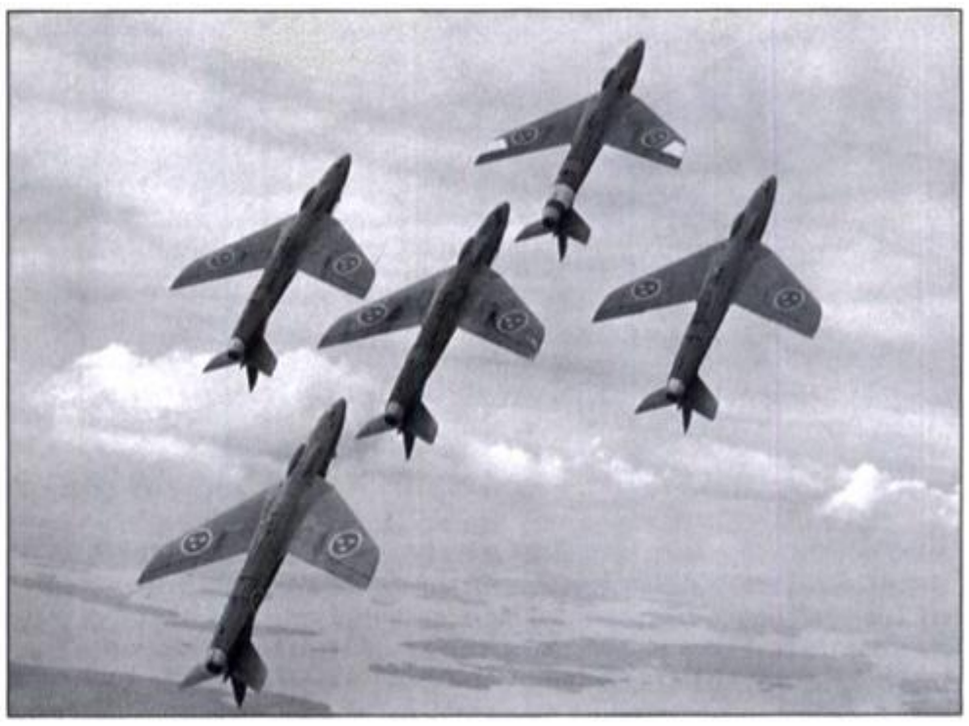
Denmark's Hunters were a mixture of 30 single-seat Mk 51s (like the Swedish aircraft, based on the Mk 4) and a pair of T.Mk 53s (essentially Mk 7s without the leading-edge extension). Issued to Esk 724, the RDAF Hunter force was drastically reduced from 1966 thanks to funding constraints.

pipe. There was also a 200-Imp gal (909-litre) forward fuselage tank, and 140-Imp gal (636-litre) bag tanks in the wings, giving a total internal tankage of 390 Imp gal (1773 litres). To this could be added four external tanks (100 Imp gal/455 litres each), or 230-Imp gal (1046-litre) tanks inboard, though the latter prevented use of the flaps and were used only for ferrying. The potential of the big tanks was demonstrated on 2 October 1958, when XF374 flew directly from Dunsfold to El Adem in Libya, a distance of 1,588 miles (2556 km).

The Hunter F.Mk 6 also introduced a Plessey Isopropyl Nitrate (AVPIN) starter. This removed the aircraft's reliance on cartridge starting, although with the benefit of hindsight it can be seen that the new system had its own drawbacks. AVPIN itself is highly unstable, and only a small amount can be carried, sufficient for a couple of start-up attempts. If an aircraft were to land at an airfield without AVPIN, there was every chance that it would not take off again. More seriously, AVPIN starters had an alarming tendency to explode, and when they did so would collapse the intakes and cause significant and expensive structural damage.

The F.Mk 6 prototype made its maiden flight on 22 January 1954, and was followed by a pre-production batch of seven aircraft (WW592-598) with Avon 203 engines and pre-Mod 228 (two-pylon) wings. Most





F.Mk 6s had the later Mod 228 wing with provision for extra outboard hardpoints. From XJ632, the Hunter F.Mk 6 introduced an extended outboard leading edge with a distinctive 'dogtooth' discontinuity on the leading edge. This cured the Hunter's tendency to pitch up, and added 9 sq ft (2.7 km²) to the total wing area. The new wing leading edge was retrofitted to all F.Mk 6s and to a handful of F.Mk 4s. From 1957, the Hunter F.Mk 6 also introduced a flying tailplane, in which the standard power-operated elevator combined with electrically actuated movement of the whole tailplane. Gun blast deflectors were added to cure the aircraft's tendency to pitch down when the guns were fired at high level.

The introduction of the F.Mk 6 marked the end of the line for the 'insurance policy' Sapphire-engined versions, although in some respects they remained superior, and would perhaps have repaid investment in further development. No production Hunter ever flew, for example, with the Series 200 Sapphire, although WN955 tested the 10,500-lb st (46.70-kN) Sapphire Sa. 7. Even the basic F.Mk 5 could outperform the big-bore F.Mk 6 up to 45,000 ft (13716 m), getting there 24 seconds earlier in only 5 minutes and 42 seconds. The F.Mk 6 was longer-legged (since it carried more fuel internally and externally) and, with 2,000 lb (8.90 kN) more thrust, was also a little bit faster. The withdrawal of the Fighter Command F.Mk 5s probably had more to do with the logistical implications of supporting another type of engine than with other factors. Initially, some F.Mk 5 pilots viewed the new type as a retrograde step.

Defence White Paper halts production

Production of the F.Mk 6 was halted by the defence cuts which followed the 1957 Defence White Paper. The cancelled aircraft were spread between Blackpool (where 50 aircraft had been due to be manufactured) and Kingston (where the final 100 aircraft were cancelled). This left production consisting of 119 aircraft manufactured by Armstrong Whitworth at Baginton, and an additional 296 (including 32 aircraft ordered by the RAF but delivered to India) by Hawker at Kingston, including the prototype and pre-production aircraft. To these were added 128 more F.Mk 56s for India and 100 F.Mk 58s for Switzerland. Other export aircraft were either second-hand or

refurbished examples, although some of the F.Mk 6s delivered to Lebanon, Jordan and Iraq were almost brand new, and had seen little RAF service.

The RAF originally had anticipated that the F.Mk 6 would serve only briefly in the fighter-interceptor role before being replaced by the missile-armed Lightning and Javelin, and that the type would then be relegated to the fighter-bomber role. In fact, the Lightning failed to meet its original In Service Date (ISD) and the Hunter F.Mk 6 remained at the forefront of Fighter Command into the first years of the 1960s, serving with 14 front-line home-based squadrons and with four squadrons in RAF Germany. The basic F.Mk 6 never served as a front-line fighter-bomber, though large numbers were converted to form the basis of the dedicated FGA.Mk 9.

Although intended only as an interim air defence aircraft, the Hunter F.Mk 6 performed surprisingly well in the fighter role, and, apart from the handful of Sapphire-powered aircraft, was the first really successful Hunter version. At the time it entered service, though, fashions in fighter design had moved on, and the F.Mk 6 seemed a very old-fashioned and modest aircraft, in both performance and appearance.

Hunter versus Sabre

If one simply looked at a limited number of performance parameters, it would be possible to conclude that even the Hunter F.Mk 6 marked little improvement over the North American Sabre, which had entered front-line service five years earlier – though such a conclusion would be far from the truth. The Sabre was ahead of its time, and had a superbly roomy cockpit and a ground-breaking blown canopy which gave its pilot an unmatched all-round view, both features which would have been envied by early Hunter pilots. The Sabre was also almost impossibly glamorous and 'space age', with its Korean War record, shiny 'bone dome' pilot's helmets and electrically actuated canopy. It was difficult for RAF Venom pilots (often still clad in soft Battle of Britain-style helmets with separate goggles) not to feel a twinge of envy even at these superficialities. The Sabre also had a hydraulic all-flying tail, sensible, effective airbrakes, and a host of other features. It was very maintainable, and easy to work on. The rear fuselage, for example, was attached by half as many bolts as that of the Hunter.

The apparently more conventional Hunter had a far more sophisticated and advanced wing section, and (when early problems were resolved) a vastly superior engine that gave a significantly higher thrust to weight ratio. The Hunter's superior acceleration, rate of climb and level speed meant that it could usually disengage from a Sabre at will, while its big high-lift wing and plentiful thrust gave it vastly superior instantaneous turn performance, although high induced drag reduced the Hunter's edge in a sustained turn. The Hunter was a better, more stable gun platform than the Sabre, and its easily removable pack of four 30-mm cannon represented arguably the best built-in armament fitted to a fighter until the dawn of the missile age. Even then the cannon were superb for strafing ground targets, and provided one of the foundations for the Hunter's extraordinary multi-role versatility. The aircraft also enjoyed greater growth potential.

The Hunter had better performance and handling characteristics in those areas of the envelope where it really counted. In particular, the Sabre was incapable of a rapid, unprepared scramble take-off, requiring as it did a massive ground power unit, comprehensive ground support equipment and a small army of ground crew. Even when the Sabre was fired up, it climbed very slowly, and its agility was such that at certain altitudes the aircraft fell easy prey to aircraft like the de Havilland Venom, let alone the Hunter or MiG-15.

Finally, the lightweight Sabre was far flimsier than the Hunter, which could pull more *g* (7 or 7.5) and sustain much higher levels of battle damage, and still limp home to be repaired to fight again. The Peruvians ran into serious problems when a number of ex-Hunter pilots converted to the Sabre. When they flew the F-86 as they would have flown their old aircraft, the Sabres started returning from DACT sorties severely overstressed, and legend has it that at least one had to be written off. Hunters were tested to 11.25*g*, and survived to fly again after a ham-fisted pilot pulled a bruising 14*g*. The Sabre was unstable at high speeds, and, if unchecked, *g* loads could increase very rapidly, leading to some Sabres being lost when overstressed by their pilots.

Although the 5,200-lb st (23.23-kN) J47 engine was an excellent fighter engine, easy to handle and maintain, it lacked power, especially at higher altitudes. Even the small-bore Hunter F.Mk 4 was still climbing at 1,150 ft (350 m) per minute at 45,000 ft (13716 m), a feat far beyond any service Sabre. The Sabre pilot could park his throttles fully forward and not worry about limiting his rpm, but the

Hunter Mk 58s J-4013/4100 (including J-4065, shown here) were new-build aircraft assembled by F+W at Essen from kits supplied by HAL. All subsequent aircraft were refurbished examples.

Above left: Switzerland's first Hunters were a batch of 12 new Mk 6s converted to Mk 58 standard (serialled J-4001/4012), with enlarged 'Sabrinas', new radios and a brake 'chute.

Below: The Mk 56 was the first 'big bore' Hunter export variant. Of the first 48 examples, 32 were cancelled RAF aircraft (BA209 would have been serialled XK165 had it been delivered), while the remainder were ex-RAF Mk 6s brought up to Mk 56 standard prior to delivery. The balance of the original order for 160 Hunters was new-build aircraft constructed at Kingston. Brake 'chutes and 230-Imp gal (1046-litre) tanks were fitted later.

Hunter Mk 4s near completion at Fokker-Aviolanda's Amsterdam plant. 'Dog tooth' leading-edge extensions appear to have been fitted to KLu Mk 4s at a later date.

Top: Sidewinder capability was added to some KLu Mk 4s and 6s after delivery, the AIM-9 rail being attached to the outer station of the Mod 228 wing. N-250 is a No. 325 Sqn aircraft.

Above right: ID-136 was among the 48 Mk 4s manufactured by Fokker for the Belgian air force and serialled ID-101/148.

corollary was that he also climbed very slowly (far slower, for example, than the Venom). The aircraft also had a pathetic 600 kt (1106 km/h) limiting speed, and could only reach Mach 1 by rolling inverted and pulling into a vertical throttle open dive – and only if it was clean. By contrast, the Hunter (cleared to 620 kt; 1106 km/h with the power controls engaged) would slip through Mach 1 relatively simply, in anything more than a 40° dive. This made it easy for Hunter pilots to 'aim' their sonic booms – a technique used many years later in southern Arabia as a terror weapon against recalcitrant tribesmen.

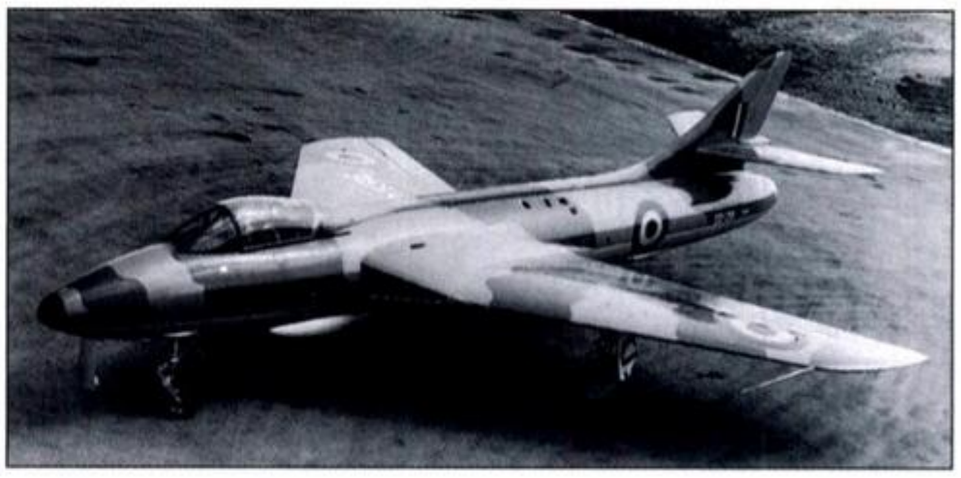
When the RAF's interim Sabres (which were the more powerful, Orenda-engined Canadair Sabres) were replaced by Hunter F.Mk 4s, few regretted their passing. They had marked a tremendous advance over the Meteor and Vampire, but were themselves regarded as being markedly inferior to the Hunter F.Mk 4. More seriously, the Sabre had been found completely unable to deal with high-flying Canberra bombers during exercises, and Sabre pilots had sometimes found themselves waxed by supposedly inferior Venoms. There was naturally some doubt as to whether the Sabre could effectively deal with the MiG-17 and Il-28, whereas, when the Hunter F.Mk 4 arrived, morale soared and such doubts evaporated. The contrast between the F-86E (or F-86F) and the Hunter F.Mk 6 was even more marked.

Hunter in the Pakistan-India wars

The relative merits of the Hunter and the Sabre have been blurred by published accounts of the successive wars between Pakistan and India, in which both aircraft types participated. The Pakistani side of the story has been told often, whereas India has remained tight-lipped about the

'Off-shore' Hunters

Before the end of 1955 Fokker-built F.Mk 4s were being delivered to the KLu. Ninety-six were completed before a change to Mk 6 production in 1957, another 93 examples of the later variant entering Dutch service. For Belgium 111 Mk 4s were built by Avions Fairey, SABCA and Fokker during 1955/57, while 144 Mk 6s (built by Fokker) were assembled by Fairey, SABCA and Fokker during 1957/58. In the absence of local funding, aircraft for both these cash-strapped NATO members were financed 'off shore' by the US. With such large numbers available, the aircraft were somewhat underutilised and boasted comparatively low airframe hours. Some Belgian aircraft spent almost all their lives in storage and their general condition made them prime candidates for refurbishment and resale by HSA.



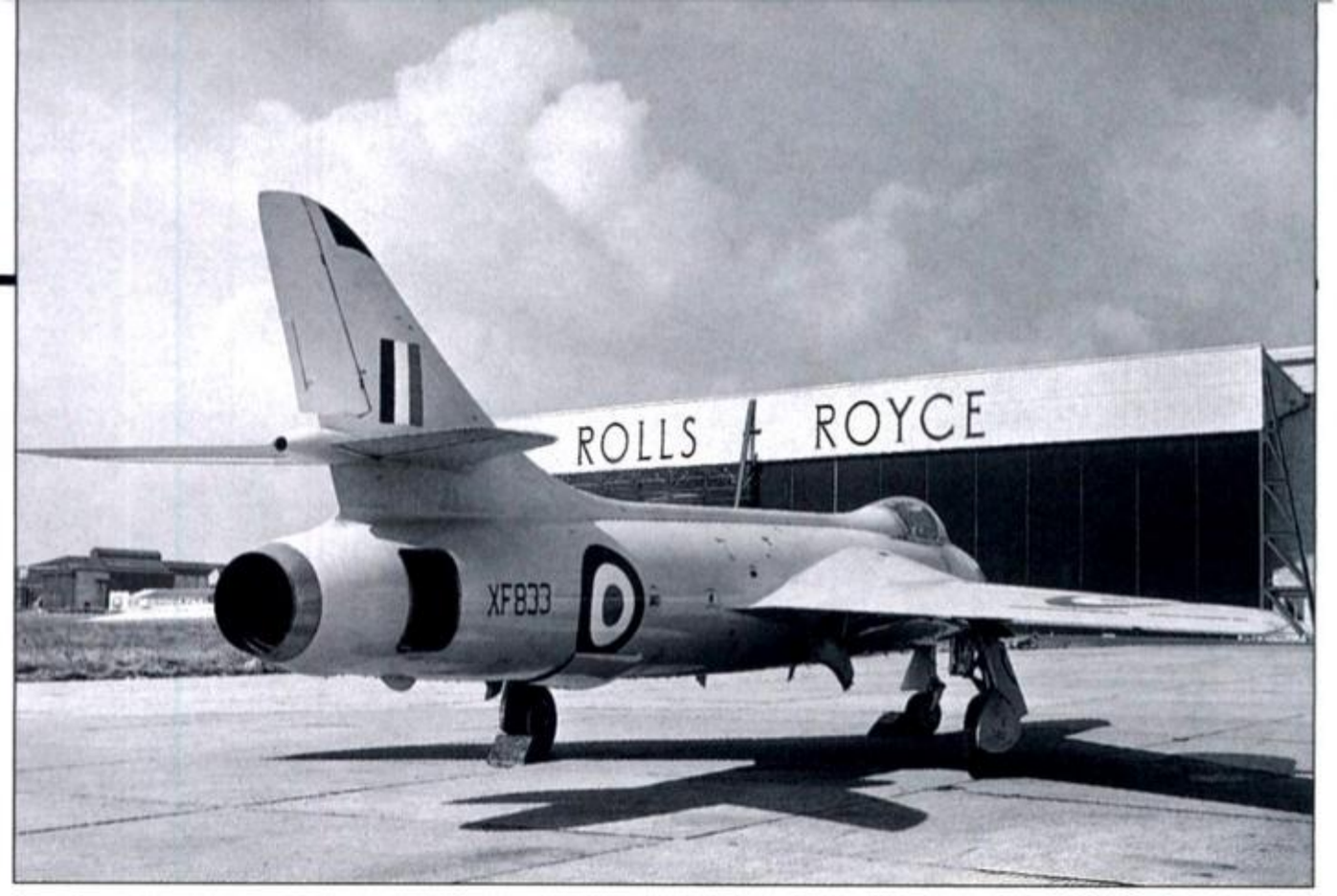
performance of its air force. The Sabre has been claimed to have been the victor of the 1965 air war, and this claim has been widely accepted, almost by default, though it does not bear close scrutiny.

The combat record of the Hunter was more impressive than unsubstantiated Pakistani propaganda would suggest. In both 1965 and 1971, Indian Hunters were operating heavily laden as fighter-bombers, at the limit of their range, and could not stay to 'turn and burn'. They were flown by relatively inexperienced young pilots trained primarily in the ground attack role. The Hunters were armed only with 30-mm cannon, while the PAF Sabres (dedicated fighters, flown by trained fighter pilots) carried AIM-9 Sidewinder AAMs.

Although Sabres did down some IAF Hunters, the tables were more frequently turned against the ageing US-built fighters, and the Hunter was the most successful Indian Air Force fighter during the war, accounting for most of the Pakistani fighters shot down. On 6 September 1965, for example, four Hunter fighter-bombers bounced a section of fighter-bomber Sabres in Indian airspace. It was a bold move, and one which resulted in the death of Squadron Leader Rafiqi, probably the leading PAF ace of the conflict, who had two Vampires and a Hunter to his credit. Two more Sabres fell to the guns of No. 7 and No. 27 Squadrons' Hunters during the same Pakistani air raid, and a fourth was downed by ground fire.

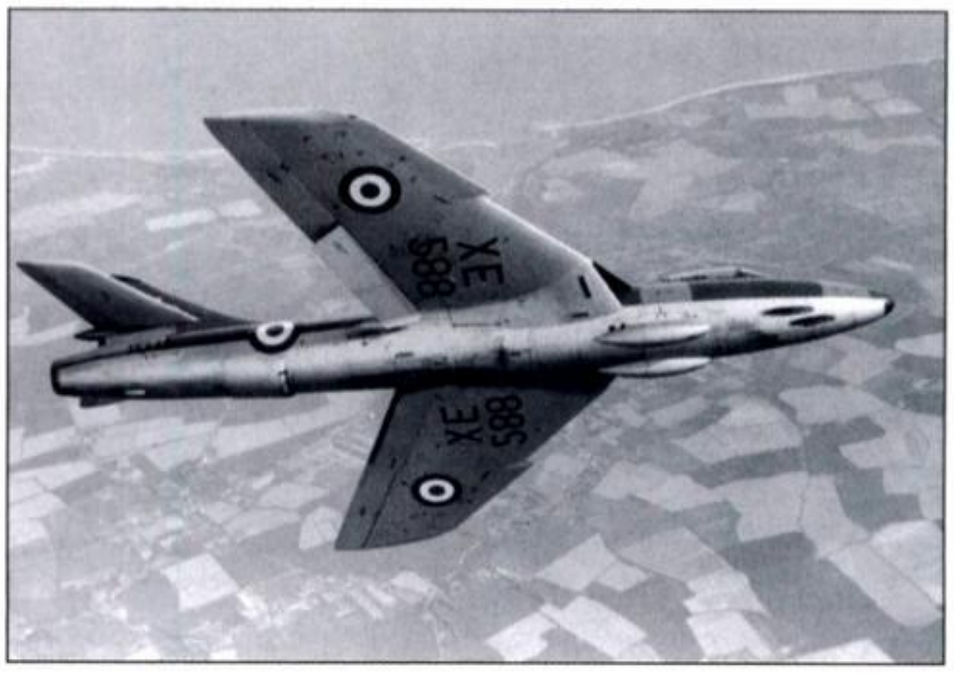
The next day, Pakistan's Squadron Leader Alam claimed to have downed five Hunters during 30 seconds of a single mission, defending Sargodha against waves of IAF fighter-bombers. This would have been a tremendous achievement, if only it had been true! At the time, the PAF released the names of Alam's supposed victims, but, unfortunately, this information eventually served to completely undermine Alam's claim. Two Hunters of the wave intercepted by Alam (at 06.05) were shot down, but the other three aircraft returned to India, where two of the pilots eventually reached air rank. Of the other names given by Pakistan, one was a Hunter pilot who had flown in an earlier wave (at 05.38) and had been forced to eject far from Sargodha following a fuel booster pump failure; the other two were Mystère pilots flying in separate waves, one early in the morning (05.38), one late (15.45) in the afternoon). One of the Mystères was destroyed by a patrolling F-104 (after shooting down another Starfighter), and the other by a Sabre. Finally, the PAF itself has admitted finding only two Hunter wrecks anywhere near the area of the engagement.

The India-Pakistan war was not the only conflict in which the Hunter performed better than propaganda may have suggested. In the Middle East, the Hunter scored a



'Big-bore' Hunter Mk 6

Powered by the improved 10,000-lb (44.48-kN) thrust Rolls-Royce Avon 203, the Hunter F.Mk 6 entered RAF service with No. 19 Sqn in October 1956. Another 18 squadrons went on to fly the type. After an interim batch of seven aircraft (WW592/598), full-scale production commenced with Kingston building 100 aircraft (XE526/561, XE579/628 and XE643/656). These were followed by a third batch of 110 from Kingston and Armstrong Whitworth's Coventry factory (XG127/137, XG150/XG172, XG185/211, XG225/239, XG251/274 and XG289/298), a fourth of 45 aircraft from Kingston (XJ632/646, XJ673/695 and XJ712/718) and a fifth batch of 53 (XK136/176 and XK213/224). This latter group was to have totalled 153 aircraft, but 100 were cancelled and only 21 were delivered to the RAF. The remainder were delivered to India as Mk 56s.



Following its first flight, on 23 January 1954, and after extensive flying trials at Dunsfold and Boscombe Down, this aircraft was delivered to Miles Aircraft Ltd, Shoreham in June 1956 for fitting of Rolls-Royce thrust-reversal equipment.

Top left: WW593 was the second production Mk 6 and one of an interim batch of seven Mk 6s with Mk 4 wings (i.e. with no 'dog tooth' and a two-pylon wing). All were initially used for testing, but the shortage of Hunter airframes during the refurbishment and resale programme saw most brought up to full production standard and exported.

Above left: XE588 is a typical production standard F.Mk 6. Note the absence of blast deflectors – a feature fitted after the Avon 200 began to suffer surge problems and aircraft 'pitch down' movements during gun firing.

number of air-to-air kills against much more modern opponents. After Jordanian Hunters were destroyed on the ground in pre-emptive Israeli air strikes at the beginning of the 1967 Arab-Israeli war, their pilots went to Iraq, where they flew Iraqi air force Hunters with conspicuous success. Perhaps ironically, a Pakistani pilot (almost certainly a former Sabre jockey) almost became the closest thing to a Hunter ace of that war, and did so against arguably the toughest opposition in the world, the Israeli Air Force. Flight Lieutenant Saiful Azam, Pakistan Air Force, was on exchange with the Royal Jordanian Air Force when the war broke out. On 6 June the young Pakistani downed a pair of IDF/AF Super Mystères, and the following day he shot down a Mirage IIIC and one of the two Vautours it was escorting.

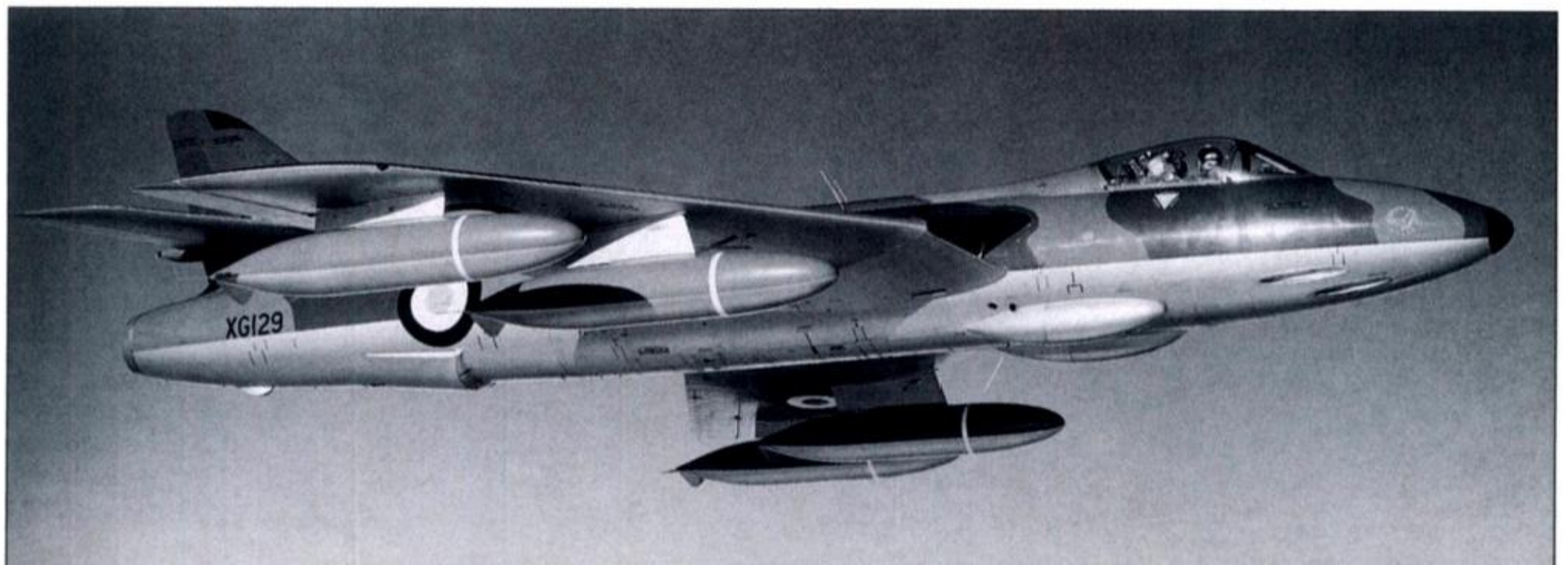
By the mid-1960s, when Indian and Iraqi Hunters were so heavily engaged in air-to-air combat, the Hunter was past its prime as an air-to-air fighter. A new generation of supersonic and bi-sonic fighters and bombers rendered a subsonic, non-missile armed, radar-less day fighter something of an anachronism, even if some of the new generation of fighters were themselves fatally flawed, with poor range/endurance characteristics and even poorer maintainability.

The English Electric P.Mk 1 Lightning started to supplant the Hawker Hunter with the squadrons of RAF Fighter Command from 1960, and by April 1963 all the air defence units had re-equipped with Lightnings (though some Lightning squadrons initially had Hunter T.Mk 7s on charge for training and as hacks). The Hunter F.Mk 6 remained in service, but only with overseas commands (operating primarily in the fighter-bomber and reconnaissance roles), with training units and with No. 38 Group, RAF Transport Command – the RAF's rapid deployment force. No. 38 Group parented two former Fighter Command Hunter units which re-equipped with dedicated FGA.Mk 9 fighter-bombers.

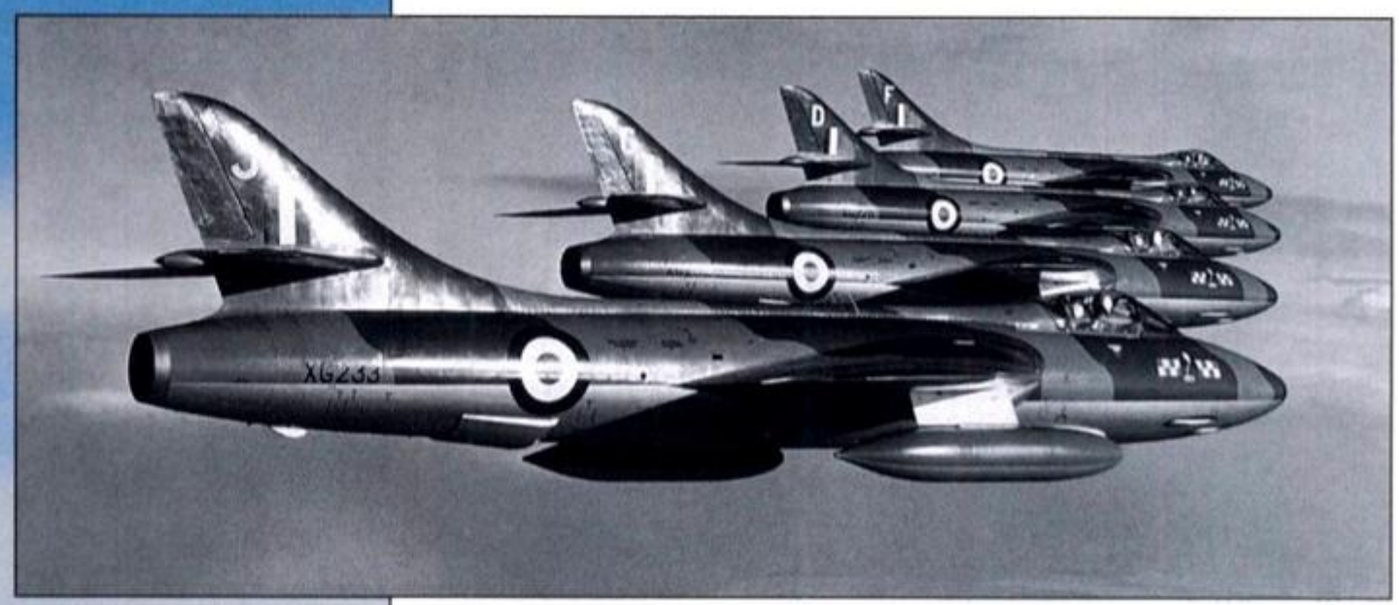
Air-to-ground

The Hunter FGA.Mk 9 originated in an RAF requirement for a replacement for the Venom fighter-bomber in NEAF, MEAF and FEAF service. A pair of Hunter F.Mk 6s (XK150 and XK151, standard apart from the installation of T.Mk 7 type brake chutes) was deployed to Aden for trials by CFE, alongside the officially proposed Venom replacements – the Jet Provost and the Gnat F.Mk 1. This was not much of a contest and resulted in a clear-cut win for the Hunter.

The FGA.Mk 9 was born as a tropicalised, ground attack-dedicated variant of the F.Mk 6, powered by a 10,050-lb st (44.70-kN) Avon 207, with new 230-Imp gal (1046-litre) underwing fuel tanks and cutaway flaps to allow them to be extended when the oversized fuel tanks were carried. The tanks allowed longer range and longer



The Mod 228 wing became standard in the Mk 6. XG129, from the third RAF batch (early examples of which, including this aircraft, were built without leading-edge extensions) was completed in August 1956 and delivered to No. 43 Sqn. In this Hawker photograph, taken en route to the 1956 SBAC display, the aircraft carries a set of 100-Imp gal (455-litre) 'bags'.



XG196 was delivered to No. 19 Sqn upon completion, but by September 1964 had joined No. 229 OCU. Here the aircraft carries the markings of No. 234 Sqn, one of the OCU's 'shadow' squadrons.

Top right: No. 92 (East India) Sqn received Mk 6s in early 1957 and operated the type until EE Lightnings entered service in 1963.

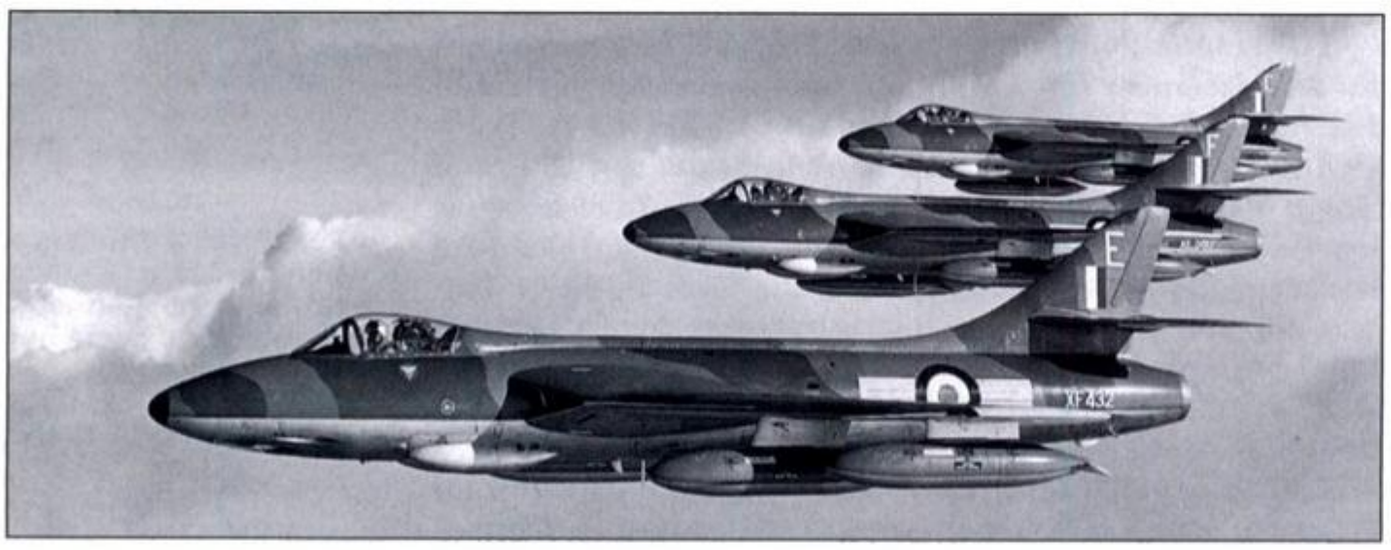
ferry range on deployment, but were stressed to be carried operationally and were fitted with a bracing strut. Given the heavier landing weights associated with the big tanks, the new version was fitted with a brake parachute, like that used on the T.Mk 7, although of larger (13-ft 6-in/4.1-m) diameter. The aircraft also received a Marconi AD.722 radio compass, and oxygen capacity was increased for the pilot. The air conditioning system was uprated, with higher mass flow and increased cockpit ventilation. The aircraft were 'tropicalised'. Cannon blast deflectors were not fitted, since they were not felt to be necessary at low level.

The prototype FGA.Mk 9 (of 128 conversions) was XG135, which made its post-conversion maiden flight on 3 July 1959. The aircraft was part of an initial order placed in 1958 with Hawker Aircraft for the conversion of 40 F.Mk 6s to full FGA.Mk 9 standards. A second conversion order was placed for 36 interim FGA.Mk 9s (sometimes referred to as 'F.Mk 6As') with the restressed and rewired wing (to allow the carriage of 230-Imp gal/1046-litre tanks and air-to-ground weapons), the new braking parachute, and some other modifications, but without the new engine. Most of these 36 aircraft were subsequently brought to full FGA.Mk 9 standards. In their initial guise, these interim FGA.Mk 9s were used only by the home-based units, including No. 43 Squadron before it moved out to the Middle East. Most were later re-engined with Avon 207s and brought up to full Mk 9 specification.

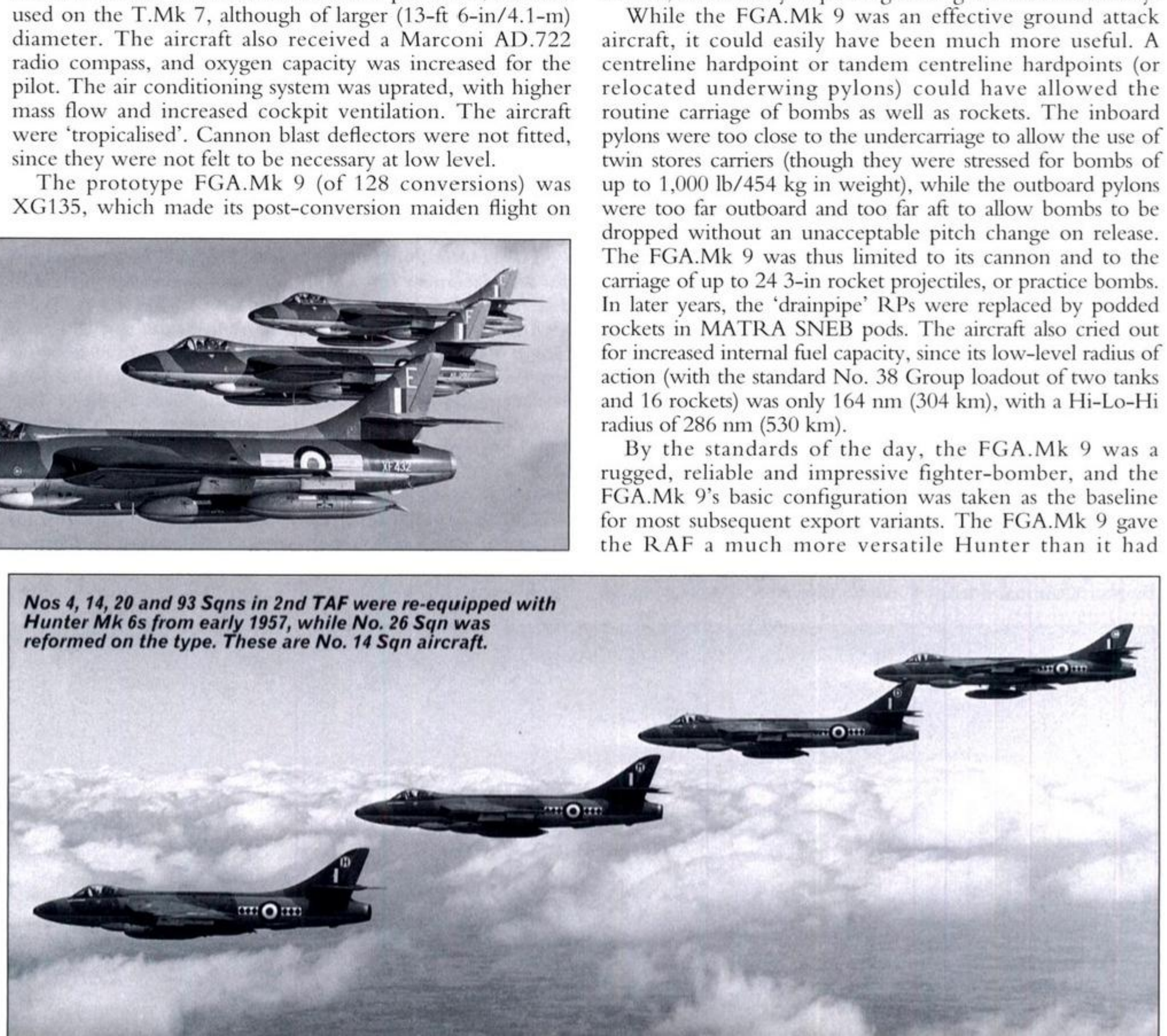
The FGA.Mk 9 was improved in service, for example with the addition of Sperry Mk 8S gunsights in 1968. The new gunsights had full air-to-air and air-to-ground modes for both gunnery and the firing of 3-in rockets and SNEB rockets, dramatically improving strafing and rocket accuracy.

While the FGA.Mk 9 was an effective ground attack aircraft, it could easily have been much more useful. A centreline hardpoint or tandem centreline hardpoints (or relocated underwing pylons) could have allowed the routine carriage of bombs as well as rockets. The inboard pylons were too close to the undercarriage to allow the use of twin stores carriers (though they were stressed for bombs of up to 1,000 lb/454 kg in weight), while the outboard pylons were too far outboard and too far aft to allow bombs to be dropped without an unacceptable pitch change on release. The FGA.Mk 9 was thus limited to its cannon and to the carriage of up to 24 3-in rocket projectiles, or practice bombs. In later years, the 'drainpipe' RPs were replaced by podded rockets in MATRA SNEB pods. The aircraft also cried out for increased internal fuel capacity, since its low-level radius of action (with the standard No. 38 Group loadout of two tanks and 16 rockets) was only 164 nm (304 km), with a Hi-Lo-Hi radius of 286 nm (530 km).

By the standards of the day, the FGA.Mk 9 was a rugged, reliable and impressive fighter-bomber, and the FGA.Mk 9's basic configuration was taken as the baseline for most subsequent export variants. The FGA.Mk 9 gave the RAF a much more versatile Hunter than it had



Above: No. 208 Sqn was re-equipped with Hunter Mk 6s in January 1958 while at RAF Tangmere and relocated to Nicosia in March. In doing so it became the first Middle East Air Force Hunter unit. These three aircraft, photographed prior to the unit's departure for Cyprus, were all later converted to FR.Mk 10 standard.



Nos 4, 14, 20 and 93 Sqns in 2nd TAF were re-equipped with Hunter Mk 6s from early 1957, while No. 26 Sqn was reformed on the type. These are No. 14 Sqn aircraft.

No. 74 Sqn operated Hunter Mk 6s for three years from November 1957. XE610 was later converted to FGA.Mk 9 standard and issued to No. 20 Sqn.

previously operated, and its introduction coincided with a radical transformation of the Hunter force. Most of Fighter Command's remaining Hunter squadrons disbanded or re-equipped with the new Lightning, eventually leaving only Nos 1 and 54 Squadrons at West Raynham, Nos II and IV in RAF Germany, Nos 20 and 28 with the Far East Air Force and Nos 8, 43 and 208 in the Middle East. All but the RAF Germany units flew the FGA.Mk 9.

Hunter fighter-reconnaissance

The RAF had a long and proud tradition of fighter reconnaissance, dating back to the Allison-engined Mustang and camera-equipped Spitfires. Just as the reconnaissance Spitfire PR.Mk 19 was soon overshadowed (and eventually replaced) by the Mosquito PR.Mk 34, so the first jet-powered fighter reconnaissance aircraft (the Meteor FR.Mk 9 and PR.Mk 10) were soon overshadowed by the Canberra PR.Mk 3, PR.Mk 7 and eventually the PR.Mk 9. The reconnaissance Canberras were more flexible than the Meteors, could carry more and larger cameras, had longer range and better high-altitude capability, and were even able to out-run the Meteors. Originally intended for high-altitude strategic reconnaissance missions, the Canberras soon turned their hands to tactical reconnaissance as well, and RAF Canberra squadrons regularly took the prizes at NATO reconnaissance competitions. It was only the limited availability of the more expensive, two-crew Canberras that left any real need for shorter-range single-seat tactical reconnaissance platforms.

By the late 1950s, two squadrons of Swift FR.Mk 5s augmented RAF Germany's Canberra PR.Mk 7 force, while ageing Meteor FR.Mk 9s still served with a single flight within MEAF, at Khormaksar. In the Far East, a handful of Meteor PR.Mk 10s remained active. The Swift had performed creditably in the reconnaissance role, but attrition, fatigue and approaching obsolescence made

Equipped primarily with the Gnat T.Mk 1 trainer from 1962 until 1977, No. 4 Flying Training School at RAF Valley (above) also operated Hunter Mk 6s and T.Mk 7s from 1967, these equipping the unit's No. 3 Training Sqn. Charged with advanced tuition for prospective fast-jet pilots, No. 3 Training Sqn initially operated Mk 6s in fighter camouflage (XG290, above left), though this gave way to a red/white training scheme in the early 1970s (XG274, left).

Above and right: Finished in glossy Aircraft Blue with white trim, wing tips and roundel outlines, the 'Blue Diamonds' comprised as many as 17 Hunter Mk 6s and a single Mk 7. Note that the Mk 6s have been fully modified with cannon muzzle deflectors, link collectors and wing leading-edge extensions.

RAF display Hunters

Given the Hunter's handling characteristics and the large numbers in service it was only a matter of time before a number of RAF units equipped with the type formed aerobatic display teams. Two of the most famous were those formed by Nos 92 and 111 Sqns – the 'Blue Diamonds' and the 'Black Arrows', respectively. The latter had the honour of being the RAF's official team from 1957 until 1961, when 'Treble One' re-equipped with Lightnings. The 'Blue Diamonds' then took over for the 1961/62 seasons.

acquiring a replacement urgent, while the FR.Mk 9s in Aden were thoroughly obsolete and were becoming difficult to support. Many hoped that this disparate bag of short-range types would be replaced by Canberra PR.Mk 7s, which would in turn be replaced by increasing the production run of the new PR.Mk 9. This option was too expensive, however, and in 1958 it was decided that the conversion of 40 redundant Hunter F.Mk 6s (then being withdrawn from Fighter Command in large numbers) would mark a more cost-effective solution.

A single Hunter F.Mk 4 had already flown with a five-camera reconnaissance nose, and a simpler three-camera nose was fitted to an F.Mk 6 (XF429), flying for the first time on 7 November 1959. This aircraft served as the prototype for the new FR.Mk 10, and was followed by 31 further conversions. The FR.Mk 10s received the same basic modifications as the FGA.Mk 9, allowing them to carry the bigger 230-Imp gal (1046-litre) underwing tanks, and had armour plate added below the cockpit floor to compensate for the removal of the ranging radar. A Wirek voice recorder was added to allow the pilot to make 'Vis-reps'. In RAF service, the Hunter FR.Mk 10 fully equipped Nos II (AC) and IV Squadrons in Germany and No. 8 Squadron's reconnaissance flight (later No. 1417 Flight) in Aden. The FR.Mk 10s were replaced by Phantoms and Harriers in the early 1970s. Some FR.Mk 10s subsequently went to No. 229 OCU and were handed on to the TWU. A number of ex-RAF FR.Mk 10s were exported, and some later export aircraft were built to FR.Mk 10 standards, while a single Jordanian F.Mk 6 and several Royal Navy GA.Mk 11s were fitted with FR.Mk 10-style camera noses.

Arguably the most famous Hunters of all, the 'Black Arrows' comprised 16 Hunter Mk 6s painted in a striking gloss black scheme (bottom). Of their many displays, that provided for the 1958 Farnborough SBAC show made aviation history and set a world record that still stands in 2000. Aircraft from other Hunter units were drafted in to make a 22-aircraft formation (right) which successfully executed two loops over the show.

Hunter at war

The Middle East had provided the RAF's Hunters with their first opportunity to fly combat sorties during the ill-fated Operation Musketeer (the Suez operation) in late 1956. This area was to be the arena for the RAF's Hunters to go to war again – twice. Whereas, in 1956, Hunters had been specially flown to the region from the UK, the RAF's Middle East Air Force had gained its own Hunter squadrons by the time they were needed again.

The Hunter FGA.Mk 9 had been designed to meet a MEAF requirement for a Venom fighter-bomber replacement. It began to enter service with No. 8 Squadron (at Khormaksar, Aden) in January 1960, followed between March and June 1960 by No. 208 Squadron at Eastleigh, Kenya.

Air-to-ground Mk 9s

Unique in terms of its procurement in that not a single new aircraft was built, the Hunter FGA.Mk 9 entered RAF service in January 1960, with No. 8 Sqn at Khormaksar (Aden). In the UK No. 1 Sqn also re-equipped in January, followed by the five remaining front-line Hunter units at home and in MEAF and FEAF. In all, 128 Hunter Mk 6s were converted to Mk 9 standard (including the 36 interim Avon 203-powered aircraft), the work being carried out by HSA and No. 5 MU at Kemble.

The Kuwait crisis erupted in the summer of 1961, when Iraq's leader, General Abdul Karim Kassim, declared that Kuwait was an integral part of Iraq, justifying his statement on the grounds that the neighbouring Emirate had been administered as part of the Basrah Province during the days of the Ottoman Empire. Kassim's inflammatory language was taken as being the precursor of an Iraqi invasion and – under Operations Vantage and Bellringer – Kuwait was reinforced by British forces.

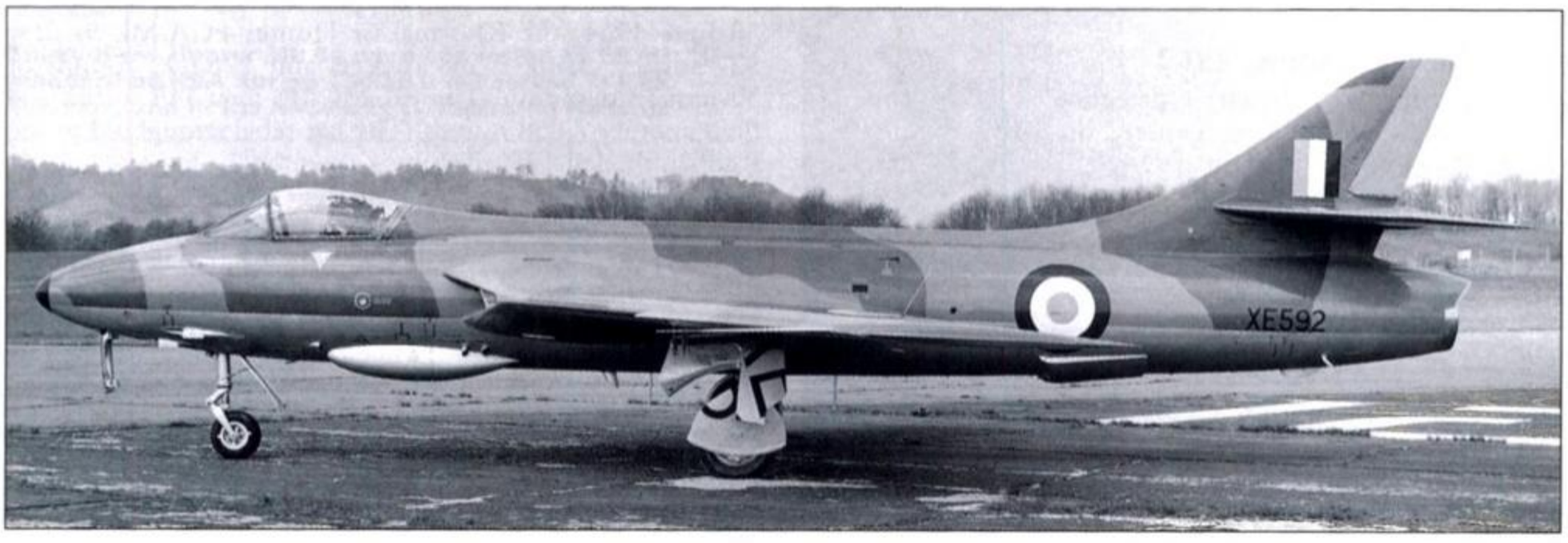
Nos 8 and 208 Squadrons (with 32 Hunters) and a number of Shackletons deployed to Bahrain, while RAF Germany Canberras moved to Sharjah. The Hunters moved forward to Kuwait itself on 1 and 2 July 1961, with radar cover provided by HMS *Bulwark* (and later HMS *Victorious*) off the coast. Finally, a mobile air defence radar was deployed to Kuwait. The Hunters were placed at 15 minutes' readiness, and additional Hunters (No. 43 Squadron from Leuchars and No. 54 Squadron from Stradishall) deployed to Nicosia on the island of Cyprus.

Tensions began to diminish when Iraq's national day (14 July) passed without incident. Thereafter, the two Middle East Air Force Hunter units were reorganised into a wing at Khormaksar, but one was always deployed to Bahrain, ready to guard Kuwait if the Iraqi threat were revived.

While things remained calm between Iraq and Kuwait until 1990, the MEAF Hunter Wing at Khormaksar was destined to be called into action sooner than that. The Aden Protectorate (a Crown Colony since 1937) had long been an unstable place, with tribesmen in the interior never entirely happy at submitting to rule from anyone, whether British or Arab. Local leaders had frequently appealed to Britain for aid against dissident tribesmen since the 1930s, and much use was made of air power to demonstrate British might and intent.

The situation worsened after the Imam of the neighbouring Kingdom of Yemen was deposed in an Egyptian-sponsored coup. Nasser's socialist-tinged Pan Arab Nationalism was a powerful force against the colonial powers in the region. Yemen's new leader, General Sallad, declared a republic and called for rebellion in the south. His appeals had little real impact among the tribes in the interior, although Yemen did begin actively supporting dissident tribesmen with arms and supplies. With Yemeni encouragement, in the city of Aden itself Marxist and nationalist groups gained support and influence, and resistance to British rule intensified as urban terrorism grew. In 1963 the People's Socialist Party and the Southern Arabian League merged to form the Organisation for the Liberation of the Occupied South (OLOS). In 1966 this group merged with the National Liberation Front to form FLOSY (the Front for the Liberation of Occupied South Yemen).

A real problem of urban terrorism was thus added to continuing problems with dissident tribesmen, exacerbated by Yemen giving indirect support of both groups and undertaking degree of incursion and infiltration. The merger of Aden with the tribal areas of the Aden Protectorate to form the Southern Arabian Federation in 1963 only worsened the



Above: Though a number of Mk 4 and 6 aircraft tested air-to-ground weapons of various types, no RAF Hunter carried rockets, bombs or napalm until the advent of the Mk 9. Here a No. 54 Sqn Mk 9 lets fly with a salvo of 3-in R/Ps. Matra SNEB pods replaced these less-than-accurate projectiles in later years.

Top: In the Mk 9 the inner pylons were strengthened to allow the carriage of 230-Imp gal (1046-litre) drop tanks, as seen here on these No. 20 Sqn aircraft.

Left: XE592 was one of the first batch of 40 Mk 6s brought up to Mk 9 standard in 1958. The braking parachute housing above the jetpipe is readily apparent.

Hawker Hunter

Above: The 230-Imp gal (1046-litre) tanks introduced on the Mk 9 could not be jettisoned as a bracing strut was fitted between the tank and the under surface of the wing, allowing the tank to be cleared for combat. In this view of XJ687 the cut-out portion of the wing flap is also visible.

Top: Based at Stradishall, No. 1 Sqn was the first home-based Hunter unit to receive the FGA.Mk 9. In 1960 Nos 1 and 54 Sqns joined No. 38 Group, Transport Command as a ground attack wing within an air support organisation for the army, comprising helicopters and transports. These No. 1 Sqn aircraft, seen over the Lofoten Islands in northern Norway, are from the batch of so-called 'interim Mk 9s' equipped with Avon 203s.

problems, introducing friction between 'town and tribes' into what was already a volatile situation.

Following the re-equipment of MEAF's squadrons with the Hunter, operations in Aden initially carried on much as before. In January 1962, for example, Hunters and Shackletons conducted an operation in which 115 1,000-lb (454-kg) bombs and 1,000 20-lb (9-kg) bombs were dropped on rebel villages and their crops – after warning leaflets had been dropped in an effort to minimise human casualties. This pattern of operations became so routine that when leaflets were dropped, villagers would troop to a neighbouring hilltop and watch the bombing before returning to their homes.

Patrols over Aden, 1962

A new threat to Britain's presence in Aden emerged shortly after the coup in Yemen, on 22 October 1962, when Yemeni aircraft began flying incursions, attacking some border villages with guns and rockets. This led to Nos 8 and 208 Squadrons maintaining dawn to dusk patrols over the border. Further incursions were deterred, and the Hunters returned to ground readiness.

The Khormaksar Hunter Wing was increased in size from March 1963 with the arrival of No. 43 Squadron from Leuchars. The squadron had previously spent an extended period in Cyprus. Just two Hunter squadrons were based permanently at Khormaksar, since one unit was inevitably deployed to Bahrain, in case of further threatening moves from Iraq.

Almost a year after the first Yemeni incursions, on 18 October 1963, a No. 43 Squadron Hunter was scrambled to intercept a Yemeni Il-28, but it immediately fled back across the border. Enemy air activity was never as intense or as worrying in Aden as were events on the ground, and it was in its capacity as a fighter-bomber that the Hunter FGA.Mk 9 was most useful to force commanders. The Hunters routinely flew patrols over the troublesome areas (known as 'flag waves'), but tended to fly at 1,500 ft (457 m) to remain safe from hostile small arms fire. The Hunters also flew shipping surveillance patrols, watching for vessels which might be attempting to supply arms to the rebels.

Despite terrorism in Aden town, the most troublesome area for the British (and for South Arabian Federation government forces) was the Radfan, a mountainous area of about 375 sq miles (971 km²), rising to 7,000 ft (2134 m) and split by deep wadis. Rebel strongholds were isolated and difficult to reach, but it became imperative that Britain demonstrate its control over the area. Thus, when rebels closed the Dhala road, Hunters supported a heliborne operation whose primary purpose was merely to demonstrate the ability of the British Army to enter the area at will.

Further incursions by Yemeni aircraft in March 1964 prompted an operation by four Hunters from No. 43 Squadron, and four more from No. 8, on 28 March. They attacked a fort on the Yemeni side of the border in retaliation for the Yemeni air force's 'impudence'.

Britain mounted a major operation to take control of the Radfan (Operation Nutcracker) in May 1964. It began with an attempt by an SAS patrol to establish a drop zone for British paratroops, but the patrol was unable to do so and was forced to withdraw under the cover of airstrikes by RAF Hunters. Instead of dropping paras, the operation was replanned using the same soldiers (and Royal Marines) on the ground, with heavy air support. Between 30 April and 30 June 1964, the Khormaksar Hunter FGA.Mk 9s flew 527 sorties, firing 2,508 rockets and 176,092 rounds of 30-mm ammunition. The FR.Mk 10s flew 115 sorties and fired another 7,808 rounds. The last rebel stronghold in the Radfan, the Jebel Huriyah, was taken on 11 June.

The subjugation of dissident tribes in the Radfan solved only one of the problems facing the British, and terrorism in Aden itself continued, while Yemeni aircraft continued to probe into southern Arabian airspace. Britain's newly-elected Labour government announced that it would withdraw its forces from Aden 'following independence', 'by 1968' – which hardly helped matters, as opposing factions began to vie for control in the vacuum that would exist after the British departure. Terrorism in Aden intensified, and Yemen began preparing for what it hoped would be a take-over of the territory it viewed as South

Yemen. Meanwhile, in the Radfan, even Operation Nutcracker could only ever be a temporary solution, and trouble began to flare up again during 1967.

The South Arabian Police mutinied in June 1967, forcing British troops onto the streets of Aden to keep order as the British forces withdrew. One of the last large-scale operations by the Khormaksar Hunters was an attack on the fort at Sharjan by eight aircraft, which scored 89 direct hits with their rockets and fired 2,940 rounds of 30-mm ammunition. No. 8 Squadron moved to Bahrain in September 1967, and No. 43 Squadron officially disbanded on 14 October, flying a 'farewell flypast' on 29 October. The squadron continued flying fighter ground attack sorties until 9 November, when carrierborne aircraft took over responsibility for covering the withdrawal of British forces. Before the mutinies of the South Arabian Police and elements of the army, it had been intended to leave No. 1417 Flight's Hunter FR.Mk 10s behind for the South Arabian Air Force, but, as it became clear that Britain would not be leaving behind a stable, friendly regime, these plans were revised, and the aircraft flew to Bahrain to rejoin No. 8 Squadron on 29 November 1967.

It ain't 'alf hot, Mum!

Conditions in the RAF Hunter's second area of combat operations – the Far East – were, if anything, even more difficult, with humidity offering as many problems as the dust and heat encountered in the Middle East, and the logistics trail from the UK being even longer. Although procured as a replacement for the Venom in the Middle East, the Hunter FGA.Mk 9 was a natural choice to replace the Venoms used in the Far East Air Force in Hong Kong and Singapore. Although FEAF's Hunters missed the Malayan Emergency itself, they played a significant part in the long-running 'confrontation' with Indonesia.

Trouble began in late 1962, when Indonesian-backed rebels began an armed revolt in Brunei, aimed at preventing Brunei, together with the territories of Sarawak and North Borneo (later Sabah), from joining the new Federation of Malaysia which was to be formed in September 1963. These three states formed the northern coastal part of the island of Borneo, accounting for roughly one-third of the island's area. The southern two-thirds consisted of Kalimantan, already part of Indonesia.

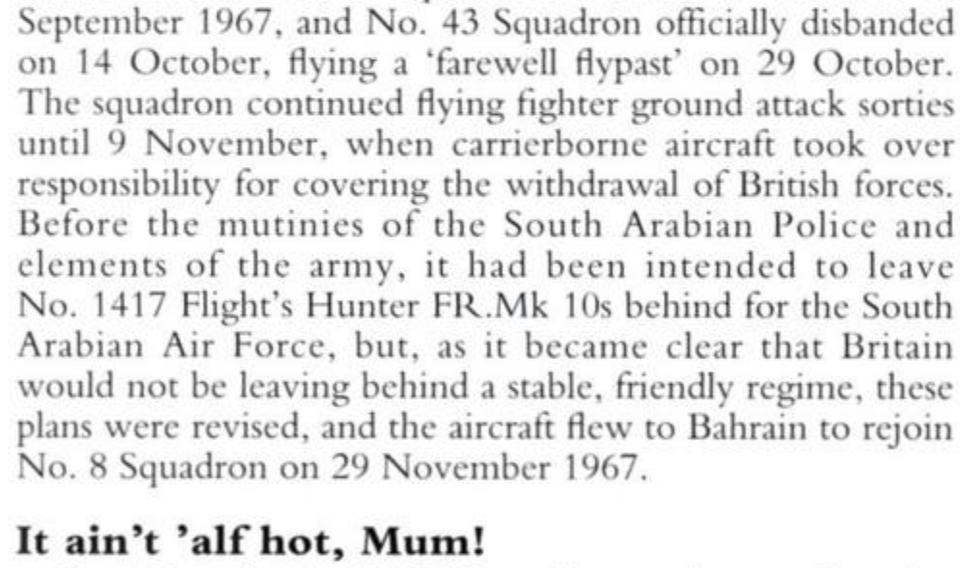
During the initial rebellion in Brunei, rebels took 48 European hostages and held out in a heavily fortified police station. The hostages were freed after four No. 20 Squadron Hunters flew a mock attack, during which one aircraft fired live cannon shells over the roof. A No. 209 Squadron Pioneer broadcast messages over a loudspeaker, further demoralising the rebels. With the failure of the rebellion, Indonesia began inserting guerrillas and Special Forces into Sarawak and Sabah, and supported these incursions with small-scale air activity, principally leaflet-

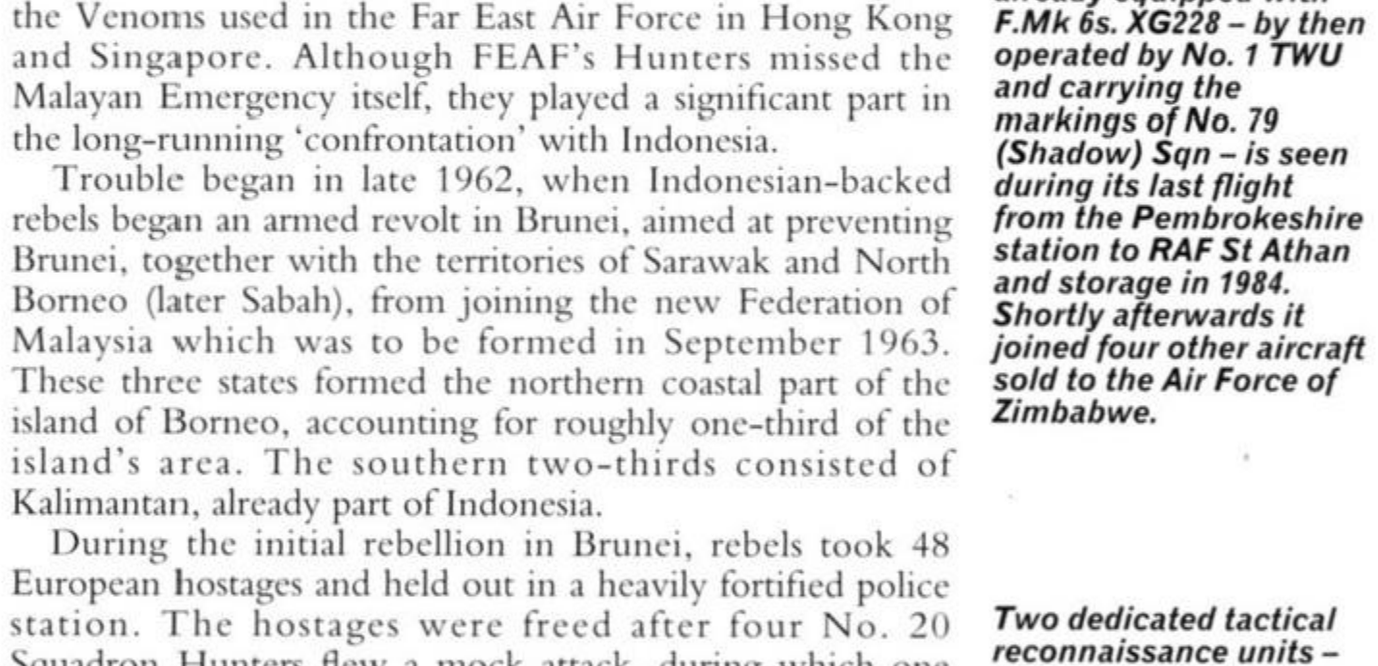
In the mid-1970s a large number of Mk 9s joined the Tactical Weapons Unit at RAF Brawdy, already equipped with F.Mk 6s. XG228 – by then operated by No. 1 TWU and carrying the markings of No. 79 (Shadow) Sqn – is seen during its last flight from the Pembrokeshire station to RAF St Athan and storage in 1984. Shortly afterwards it joined four other aircraft sold to the Air Force of Zimbabwe.

Two dedicated tactical reconnaissance units – Nos II and IV Sqns – were equipped with Hunter Mk 10s from early 1961. XF428/'C' of No. IV Sqn rests in a dispersal, probably at Gütersloh, the unit's base from 1961 to 1969.

Fighter-recce Mk 10

Thirty-three Hunter Mk 6s were converted to FR.Mk 10 standard by HSA during 1960/61. All served in RAF Germany and in the Middle East, replacing Meteors.



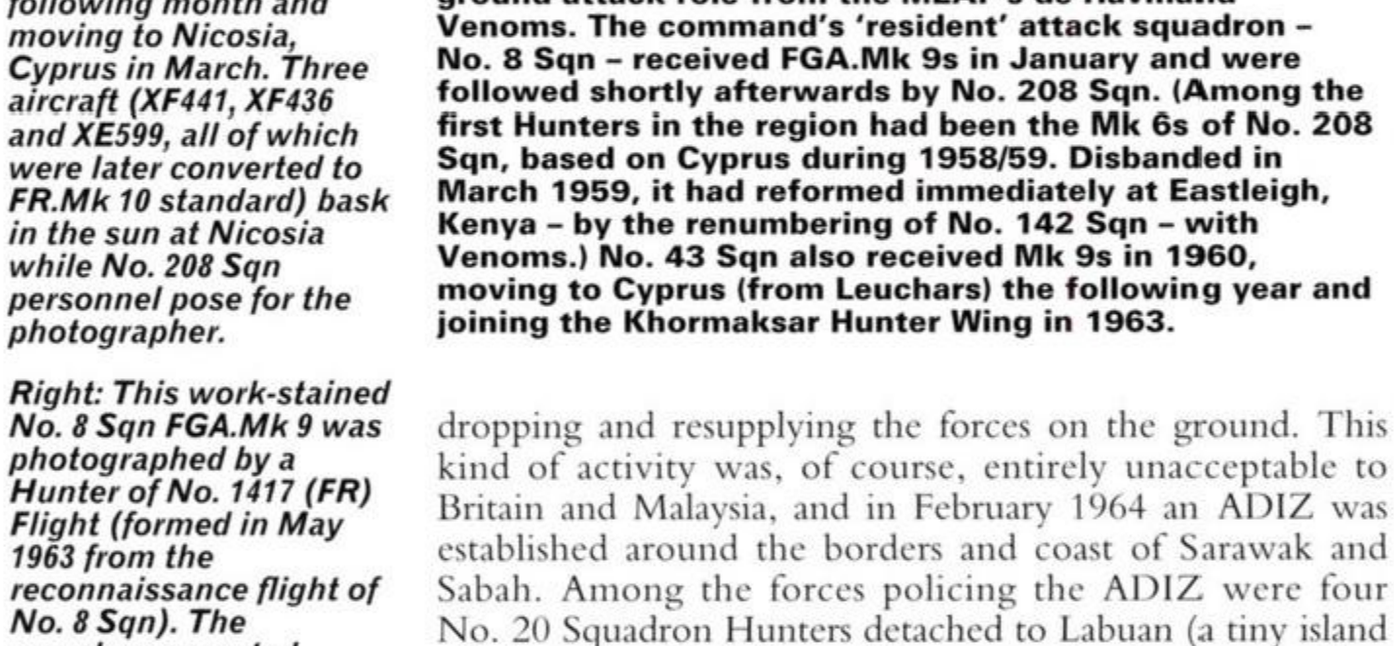


Left: FR.MK 10 prototype XF429 models the salient features of the new variant, namely the new camera nose (with three oblique cameras installed) and a set of Mod 228 wings. Note that the aircraft's cannon armament was retained.

No. 208 Sqn took over No. 34 Sqn's Hunter Mk 5s at RAF Tangmere in January 1958, converting to Mk 6s the following month and moving to Nicosia, Cyprus in March. Three aircraft (XF441, XF436 and XE599, all of which were later converted to FR.Mk 10 standard) bask in the sun at Nicosia while No. 208 Sqn personnel pose for the photographer.

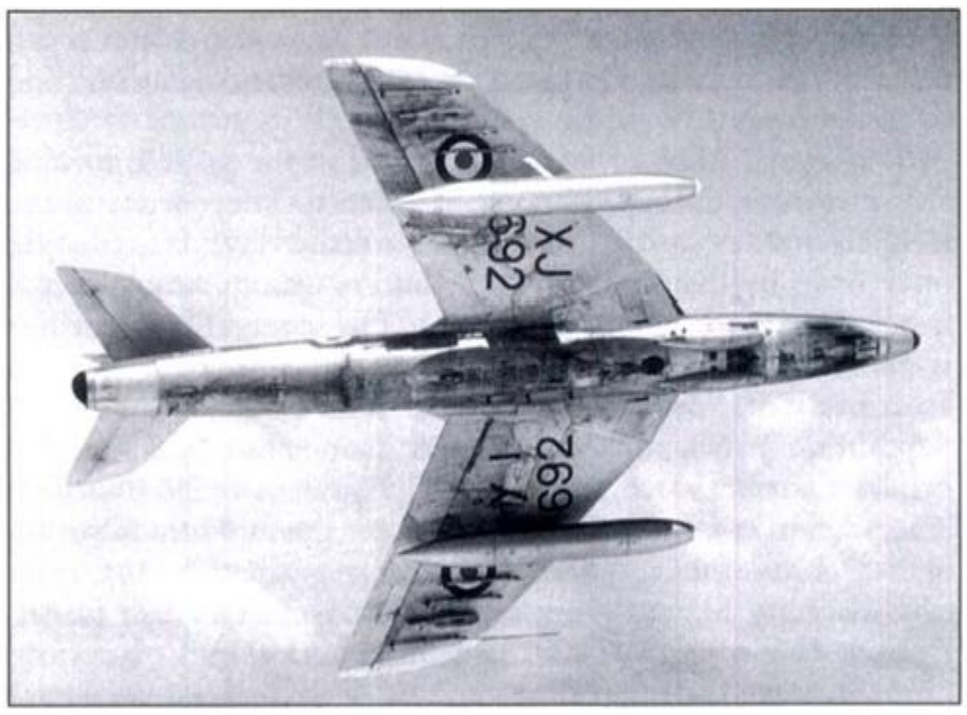
Right: This work-stained No. 8 Sqn FGA.Mk 9 was photographed by a Hunter of No. 1417 (FR) Flight (formed in May 1963 from the reconnaissance flight of No. 8 Sqn). The squadron operated Mk 9s for almost eight years from January 1960.

Below: No. 43 Sqn was the third Hunter squadron to join the Khormaksar Hunter Wing. 'Fighting Cocks' Mk 9 XE611 fires a salvo of 3-in R/Ps during armament practice at Aden.



MEAF Hunters

Beginning in 1960, the Hunter began to take over the ground attack role from the MEAF's de Havilland Venoms. The command's 'resident' attack squadron – No. 8 Sqn – received FGA.Mk 9s in January and were followed shortly afterwards by No. 208 Sqn. (Among the first Hunters in the region had been the Mk 6s of No. 208 Sqn, based on Cyprus during 1958/59. Disbanded in March 1959, it had reformed immediately at Eastleigh, Kenya – by the renumbering of No. 142 Sqn – with Venoms.) No. 43 Sqn also received Mk 9s in 1960, moving to Cyprus (from Leuchars) the following year and joining the Khormaksar Hunter Wing in 1963.



dropping and resupplying the forces on the ground. This kind of activity was, of course, entirely unacceptable to Britain and Malaysia, and in February 1964 an ADIZ was established around the borders and coast of Sarawak and Sabah. Among the forces policing the ADIZ were four No. 20 Squadron Hunters detached to Labuan (a tiny island off the coast of Sabah), and four more detached to Kuching in the south of Sarawak.

Unusually, little secret was made of the rules of engagement, which allowed pilots to engage and destroy hostile aircraft without permission from the ground. Incursions by Indonesian aircraft ceased, but guerrilla/Special Forces activity on the ground continued. Indonesian forces also raided targets on the Malay Peninsula itself, and the Indonesian navy attacked a Malay patrol boat. The situation steadily worsened.

On 2 September 1964, an Indonesian C-130 penetrated Malay airspace and dropped 96 paratroops – all but two of whom had been killed or captured by the end of the month. The aircraft had escaped interception, and this led to fears that Indonesian bombers might follow and attempt to attack Labuan and Kuching. The RAF's alert posture was intensified in the long term, and 14 dedicated Hunter sorties were made against the Indonesian paras in the short term. This paradrop incident was one of 41 landings by Indonesian forces made between 17 August 1964 and 29 March 1965, most of which were made from boats. Of 451 Indonesians who went ashore, 142 were killed, and the remaining 309 were captured.

Another planned wave of incursions began on 30 May 1965, when 25 Indonesian troops landed and set up a fortified base, awaiting reinforcement. Malay ground forces were unable to dislodge the Indonesians, who were successfully rounded up only after a number of cannon and rocket attacks by RAF Hunters.

In addition to standing QRA and attacking Indonesian forces on the ground, the Hunters escorted RAF transport aircraft engaged in supply dropping to British and local forces operating in the jungle. There are persistent rumours that the Indonesian confrontation provided kills for the Javelin and the Hunter. Stories suggest that a Javelin downed an Indonesian transport over the sea, and that a Hunter scored a 'manoeuvre kill' over a MiG-17, forcing it into a steep dive from which the Hunter recovered via a

A pair of No. 8 Sqn aircraft is seen during low-level training. Though MEAF Hunters came close to action during the 1961 Kuwait Crisis, it was January 1962 before bombs were dropped 'in anger' on tribesmen in Aden.

rolling pull-out – a manoeuvre which the MiG-17 was unable to emulate, flicking into a spin at low level. The incident (according to the stories) was hushed up because it took place on the wrong side of the featureless border. If the incident did happen, it was the Hunter's only air-to-air kill in RAF service.

A peace treaty was signed on 11 August 1966, allowing No. 20 Squadron's detachments to return to their Tengah (Singapore) home. The squadron disbanded on 18 February 1970.

Goodbye to all that

While the overseas-based Hunters were busy fighting Indonesian infiltrators or recalcitrant Yemeni tribesmen, the home-based FGA.Mk 9 squadrons were not inactive. Nos 1 and 54 Squadrons had been transferred from RAF Fighter Command in December 1961, coming under the operational control of Transport Command's No. 38 Group. This organisation was then a new rapid-deployment tactical transport and support force whose primary role was to support UK forces engaged in out-of-area brushfire wars and operations.

The Hunter Wing at Stradishall had already been practising out-of-area, deployed operations, close air support and army co-operation tactics and techniques for some months, dropping bombs, firing rockets and strafing ground targets, and soon began a regular cycle of overseas deployments and exercises. In early 1963, for example, No. 54 Squadron deployed to Bahrain for a month of live firing, and also carried out reconnaissance patrols along the Yemeni border. In October 1963 both squadrons, and a flight of No. II (AC) Squadron FR.Mk 10s, deployed to El Adem. No. 1 Squadron moved to Wittering on 18 July 1969 and began converting to the Harrier. No. 54 Squadron disbanded on 1 September 1969, although the unit's Hunters and aircrew became the UK echelon of No. 4 Squadron as it began Harrier conversion. The No. 54 Squadron numberplate, meanwhile, was transferred to a new unit converting to the F-4M Phantom FGR.Mk 2. The redundant FGA.Mk 9s were transferred to No. 229 OCU, replacing the last of the unit's ageing F.Mk 4s, augmenting F.Mk 6s.

Refurbish and resell

The Hunter's historic status as one of the world's greatest aircraft tends to obscure beginnings which were sometimes less than happy. Belgium, in particular, was bitterly disappointed with its Hunters and, even before the improved F.Mk 6 arrived, decided to replace the troublesome type. The Belgians had been shocked by the deficiencies and limitations of the F.Mk 4, and were not prepared to stick with the aircraft while solutions were found. The Dutch retained their Hunters longer, and were more satisfied (especially with the later F.Mk 6), but still retired the aircraft after a relatively short career. By that time, the Hunter's problems had been cured, and Hawker could see a

FGA.Mk 9 XF435 carries the hybrid marking of Nos 8 (yellow/blue/red stripes) and 43 Sqns (black/white checks) applied when the aircraft were based at Khormaksar with No. 208 Sqn and No. 1417 Flight as part of the Khormaksar Hunter Wing.

market for refurbished aircraft (production having ceased) if airframes could be found to convert. The surplus Dutch and Belgian aircraft thus fuelled a second export boom.

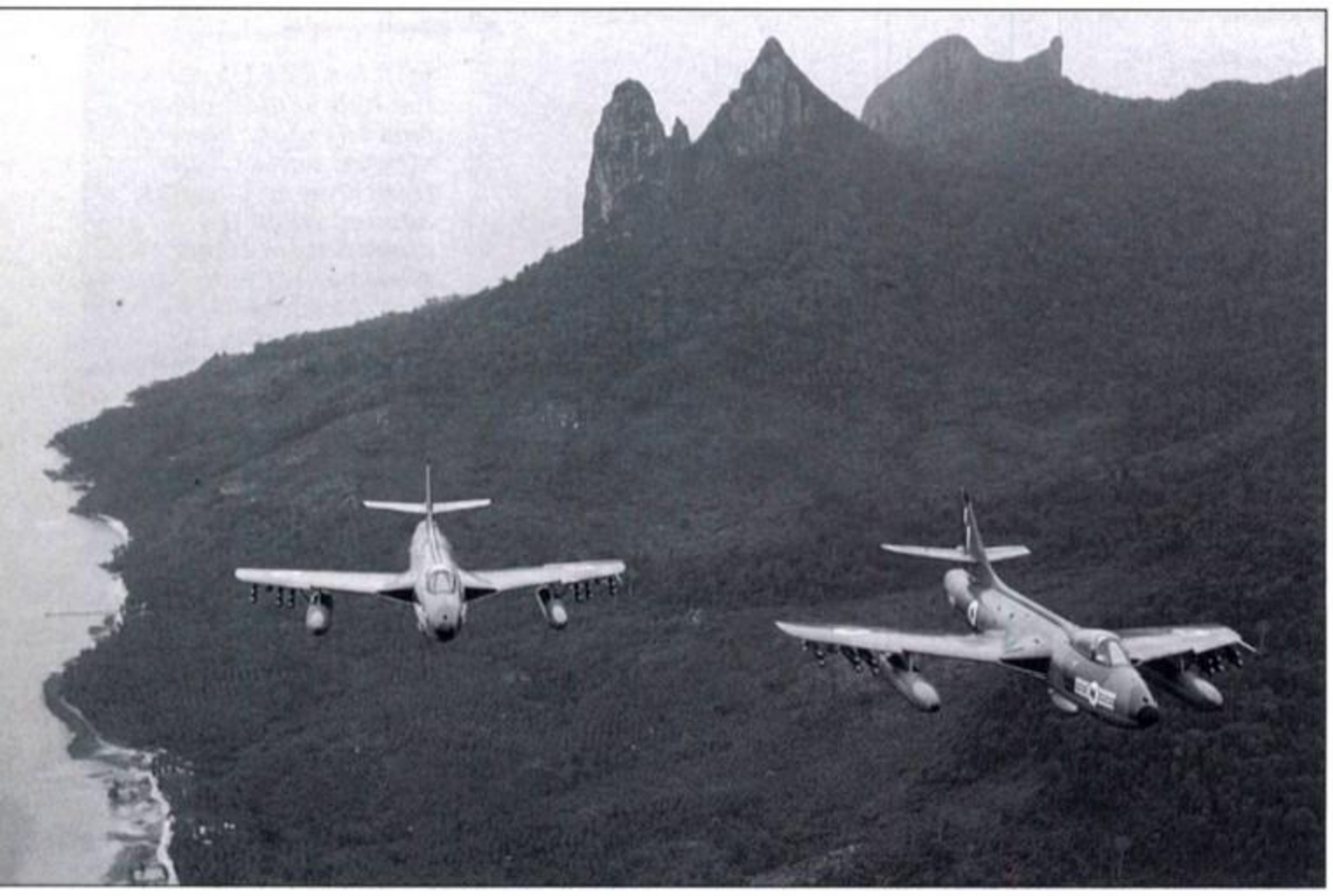
Hawker bought back large numbers of Belgian and Dutch Hunters, but paid little more than their scrap metal value, despite the fact that the Belgian F.Mk 6s had flown under 50 hours each. The first batch of 32 F.Mk 6s (which had cost Belgium US$280,000/BFr 14 million each), were bought back for US$32,000 (BFr 1.6 million) each, with a token extra payment of US$13,000 (BFr 650,000) when the aircraft were sold on. The first ex-Dutch aircraft (21 F.Mk 6s and a T.Mk 7) were about to be used for fire-fighting training at Deelen, and were swapped for 18 Hawker Sea Furies. The Dutch aircraft were far from being worn out wrecks, and most were able to fly to Dunsfold. These aircraft were followed by four ex-Dutch T.Mk 7s, and then by a final batch of 64 Belgian F.Mk 6s and by 22 Dutch aircraft.

The Hunter was an easy aircraft to refurbish, its modular construction making it easy to incorporate new components

A Beverley C.Mk 1, a No. 206 Sqn Comet C.Mk 2 and a Fleet Air Arm Gannet AEW.Mk 3 share the ramp at Khormaksar with a No. 208 Sqn Hunter FGA.Mk 9 undergoing checks. The sphinx in the squadron's badge was a reference to the unit's long period of service as an army co-operation squadron in Egypt after World War I.

Sixteen F.Mk 6s and a pair of T.Mk 7s of No. 20 Sqn pose for official photographs at RAF Tengah, Singapore on the occasion of its 50th anniversary. The aircraft coded 'XX' (XJ673) was that of the unit's commanding officer.

Below: Over typically rugged Far Eastern terrain a pair of No. 20 Sqn Mk 9s patrols along the Malayan coast in 1965. Each carries 12 R/Ps and two 230-Imp gal (1046-litre) tanks.



Far Eastern service

The FEAF had two Hunter-equipped squadrons, the formerly Germany-based No. 20 Sqn reforming at Tengah, Singapore in September 1961 with FGA.Mk 9s. It was joined in May 1962 by No. 28 Sqn which traded its de Havilland Venoms for Mk 9s at Kai Tak and remained at the Hong Kong base until 1967. No. 20 Sqn became involved in the 'confrontation' with Indonesia over the territories on the island Borneo during 1962/1966 and finally left the region in 1970.

The second-hand Hunter export programme gathered its own momentum, and was only limited by the availability of airframes for conversion. The seemingly huge stockpile of ex-Belgian and -Netherlands aircraft was not sufficient, and Hawker Siddeley began buying back elderly RAF Hunters which had long been relegated to ground instructional duties. They included large numbers of F.Mk 4s at RAF Halton, many of which had not flown for more than 10 years. Others came from RNAS *Condor* (Arbroath), and some had been among the last F.Mk 4s flying with No. 229 OCU. Large numbers of redundant F.Mk 6s were also repurchased, along with a handful of GA.Mk 11s. In the end, these aircraft were numerically more important than the Dutch and Belgian aircraft, especially for the Chilean, Singaporean, Qatari, Abu Dhabi and Kenyan orders, and for later Swiss batches. The Dutch and Belgian machines were primarily refurbished for Chile, Iraq, India, Jordan, Kuwait, and Lebanon.

Eventually, even the supply of ex-RAF Hunter ground instructional airframes dried up, which undoubtedly limited the size of the Chilean order and may have prevented further orders from new customers. When the refurbishing programme ended, Hawker Siddeley still had a stock of unsold Danish aircraft, but they had seen heavy use and had been poorly maintained, and were not really economically viable as refurbishing prospects. Many RAF Hunters had been broken up with very little flying time, many years before, otherwise the number of refurbished and re-exported Hunters may have been very much higher than the 302 fighters and 52 trainers actually 'processed'.

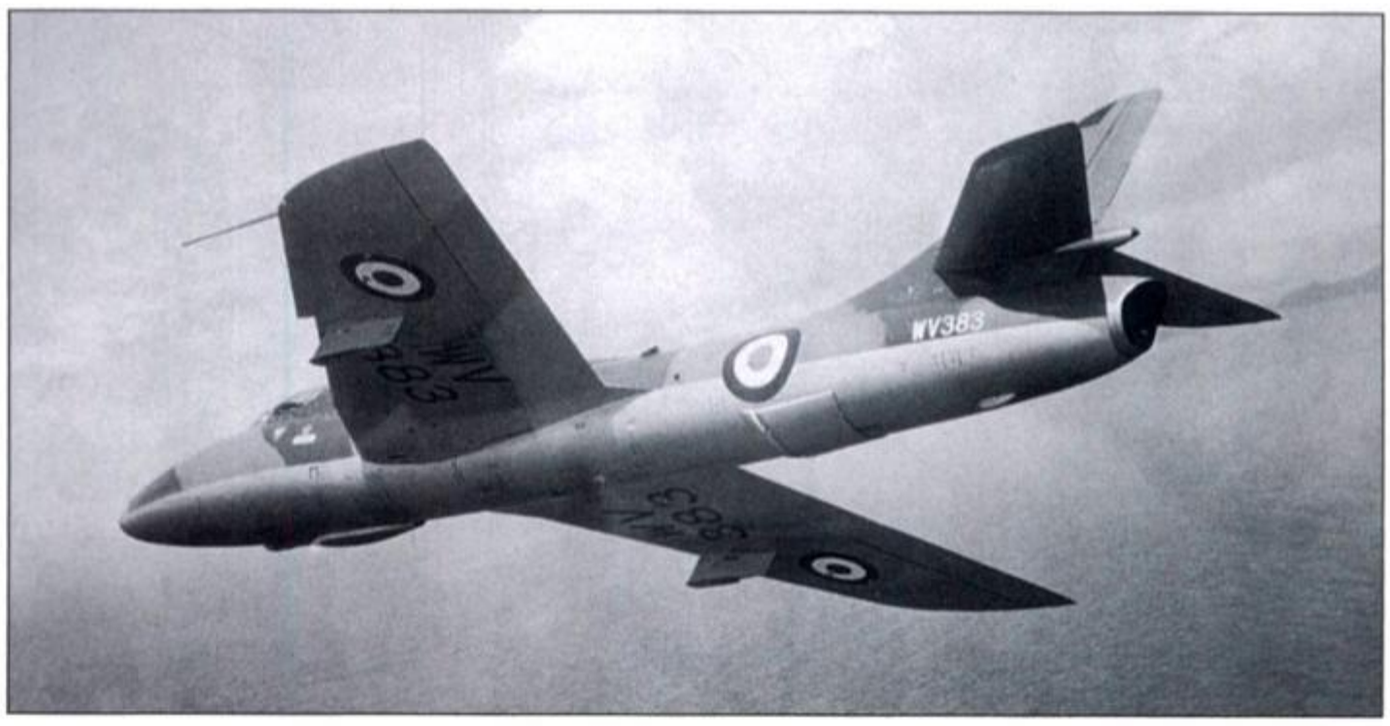
Most of the refurbished export Hunters were modified to a standard which was broadly equivalent to that of the RAF Hunter FGA.Mk 9, with various different avionics items, and sometimes with the under-floor armour associated with the Hunter PR.Mk 10. Some aircraft (especially for Singapore) were delivered with camera noses as virtual PR.Mk 10s. Some operators later added further improvements and new weapons. There was never a true second-generation Hunter, although such a thing was proposed and studied on more than one occasion.

Other operators, other wars

The operational use of the Hunter by the RAF, by India, and by the Arab nations during the Arab-Israeli war of 1967 has already been described. The aircraft was also used in combat throughout the 1970s by a number of operators,

or assemblies from other airframes. Aircraft arriving at Dunsfold or Kingston for refurbishing were carefully surveyed, and the extent of the modifications varied significantly from aircraft to aircraft. The work sometimes involved extensive reskinning, sometimes the provision of new bottom mainspar booms, sometimes new wings (spares held in stock) and sometimes a new canopy, manufactured by Folland at Hamble. Some single-seaters were rebuilt as two-seaters, and at least one two-seater became a single-seater. Rear fuselages could be rebuilt to allow installation of the big-bore engine on aircraft which had been F.Mk 4s or basic T.Mk 7s: this involved a complete rebuild between Frame 25 (aft of the mainspar) and Frame 40a (the transport joint and engine attachment point).

Armourers winch an ADEN gun pack back aboard Hunter Mk 9 'F' of No. 20 Sqn during a rapid turnaround at RAF Tengah during the Borneo confrontation.



the longest-running war in which it was involved occurring in southern Africa.

The Hunters belonged to Rhodesia, and the war was between the minority white government and terrorist guerrilla groups whose aim was to install a majority black administration. The Rhodesian government under Premier Ian Smith had unilaterally declared independence from Britain, which had intended to grant independence only after a transition to majority rule was properly underway. Rhodesia's long struggle for survival in the face of international disapproval, sanctions and embargoes was extraordinary, and the Rhodesian armed forces were forced to use initiative and innovation to continue their ultimately unequal struggle. The main opposition groups were tribally based, and consisted of ZANLA (Shona-based and led by Robert Mugabe) and ZIPRA (Ndebele-based and led by Joshua Nkomo), whose guerrillas tended to be based in neighbouring Angola, Botswana, Mozambique, Tanzania and Zambia. The Rhodesian Air Force's small but highly trained force of Hawker Hunters played a relatively limited part in anti-terrorist operations in the interior, but were used extensively in attacks on terrorist bases and training camps in neighbouring countries. The Rhodesian Hunters used a range of weapons, including their internal 30-mm cannon, 3-in rockets, and various indigenously designed and locally produced munitions. These included cluster bombs filled with anti-personnel flechettes, napalm weapons and the Golf blast/fragmentation bomb.

Highlights of the Hunter's war included a 1966 attack against Frelimo guerrillas in neighbouring Mozambique (then still under Portuguese control, and a potential ally), and attacks against camps in Mozambique in August 1974 and November 1977 which led to the deaths of 300 and 1,200 terrorists, respectively.

By 1978 even hard-line white Rhodesians were accepting the inevitability of majority rule, and Ian Smith set a provisional timetable with a transitional government which would lead to majority rule by the end of that year. Smith even held secret talks with Nkomo. The chances of a smooth transition were destroyed on 3 September 1978, however, when ZIPRA shot down an Air Rhodesia

Refurbish and re-sell

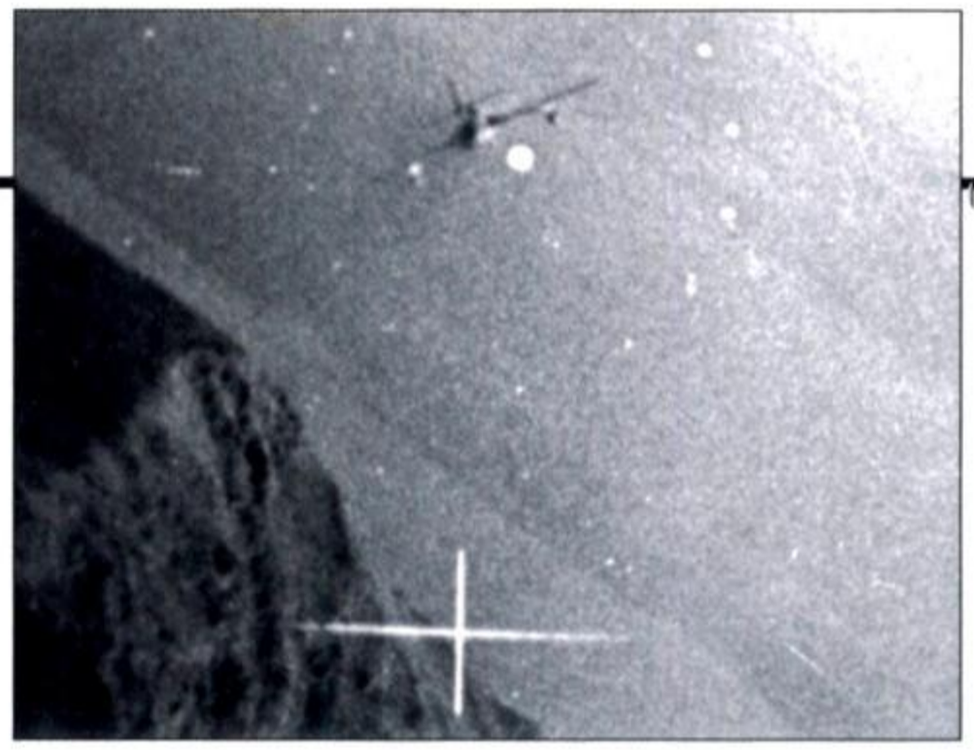
Given that most of the RAF's redundant early Hunters had been either scrapped, fatigue tested to destruction or earmarked for conversion for further use, HSA was forced to look to retired Dutch- and Belgian-built aircraft for a source of airframes. Once this supply was exhausted, long-retired RAF aircraft reduced to instructional use were sought. In all over 350 single- and two-seat Hunters were rebuilt and sold to 14 countries, some placing repeat orders, others buying Hunters for the first time.

Photographed shortly after its delivery to Kai Tak, No. 28 Sqn's T.Mk 7 (one of those converted from an F.Mk 4) has yet to have unit markings applied. Note the rocket rail attachment points under the wings – not a common fitting on a T.Mk 7.

Above left: In typically humid conditions at Kai Tak a No. 28 Sqn aircraft is refuelled and checked prior to another armament practice sortie.

Left: Large numbers of redundant Hunters were repurchased by HSA to provide airframes for the refurbishment programme. These ex-Belgian F.Mk 4s await rebuilding to Mk 56A and 59 standard for the Indian and Iraqi air forces, respectively. G-9-92 was IF-122 in the BLu/FAB and became Hunter FGA.Mk 59 579 in the Iraqi air force.

Below: T.MK 66A G-APUX was constructed by HSA from a number of airframes and served as a demonstrator from 1959 before being sold to Chile as a T.Mk 72.



This gun camera footage shows the last moments of an RJAF Hunter caught by Ran Ronen while piloting a Shahak (Mirage III) of No. 119 Sqn, IDF/AF on 13 November 1966. In a particularly long combat Ronen fought the Hunter for more than eight minutes at very low altitudes. The RJAF pilot, Mawafaq El-Salti, was killed when his aircraft rolled just as he ejected.

Most of Jordan's original batch of ex-RAF F.Mk 6s, of which 704 (ex-XF498) was an example, were destroyed at the hands of the IDF/AF at Mafraq, Jordan on 5 June 1967.

Bottom: Lebanon's initial batch of US-funded Mk 6s delivered in 1958 was followed in 1964 by a batch of three T.Mk 66Cs and in 1965/66 by four FGA.Mk 70s (illustrated), all seven aircraft having been converted from ex-Belgian Mk 6s. The latter were equipped to Mk 9 standard with Mod 228 wings, 230-Imp gal (1046-litre) tanks and brake 'chutes.

Right: On 16 September 1983, after a UN Multi-National Force had entered Beirut to help stabilise the Lebanese capital as Israeli units withdrew, three Force Aérienne Libanaise Hunters entered the fray for the first time since the Israeli invasion. Attacking Syrian AA positions, one aircraft subsequently crashed in the sea, while a second crash-landed at RAF Akrotiri. One of the three aircraft (seemingly a two-seater) is seen here over Beirut during the ill-fated sortie.

Viscount airliner, which crash-landed. Ten of the 18 survivors were massacred by guerrillas, five of the others having gone for help and the remaining three hiding. The dead included women and children. This atrocity provoked arguably the biggest Rhodesian air strike of the war, which took place on 18 October 1978 against a camp in Zambia. The attack, by four Canberras, six Hunters and four Alouette III gunships (with a DC-3 command post and two more Hunters providing top-cover), resulted in an estimated body count of 1,500, though many believe that the attack on ZIPRA's base at Westlands Farm accounted for an even larger number of dead.

Four Hunters attacked the camp first, using the Golf fragmentation bombs, followed by the Canberras with Alpha anti-personnel bombs. The four helicopters then attacked, in concert with two Hunters dropping Frantan (napalm) bombs. The pilot of the lead Canberra, Green Leader, broadcast a message to the air traffic control tower at Lusaka and the Zambian air force base at Mumbwa.

"Tower, this is Green Leader. This is a message for the Station Commander at Mumbwa from the Rhodesian Air Force. We are attacking the terrorist base at Westlands Farm at this time. This attack is against Rhodesian dissidents, and not Zambia. Rhodesia has no quarrel, repeat no quarrel with Zambia or her security forces. We therefore ask you not to intervene or oppose our attack. However, we are orbiting your airfield at this time and are under orders to shoot down any Zambian Air Force aircraft which does not comply with this request and attempts to take off. Did you copy that?"

The two top-cover Hunters (armed with Atlas Darter AAMs) orbited Lusaka with the lead Canberra. At one point Lusaka tower asked the Canberra for permission to allow an incoming airliner to land, which was granted after consultation with the Dakota command post. Green Leader thanked Lusaka for its co-operation as the last three Rhodesian aircraft left the area. The Hunters continued to fly missions against the guerrillas until the end of the war in Rhodesia.

Iraqi bomber escort

Hunters were still in service with Iraq when a second Arab-Israeli war broke out in 1973. This time, Jordan was not involved in the war, and its Hunters remained aloof from the conflict. Iraqi Hunters operated in the fighter-bomber role and as escort fighters, helping Syrian MiG-21s in the escort of Su-7 fighter-bombers. Five Iraqi Hunters are believed to have been lost in air-to-air combat, and two to ground fire, although more victories were also claimed.

While Britain remained in control of the Aden Protectorate, Oman had to contend only with internal dissidents (who were backed by Saudi Arabia, Iraq and Egypt), but after the British withdrawal Oman also had to contend with Yemeni-backed insurgency across the South Yemen border. The British provided low-key assistance to the Sultan in his efforts to put down the growing rebellion in the Dhofar region, and this is believed to have included sorties flown by Hunters based in nearby Bahrain. British assistance increased after the extremely conservative Sultan was deposed by his son, Qaboos bin Said, a Sandhurst-trained liberal who instituted wide-ranging reforms. The Sultan of Oman's Air Force took delivery of its own Hunters from August 1975, and they were soon in action against PFLO guerrillas in western Oman. The Hunters were flown by a mix of RAF pilots on temporary attachment to the SOAF, and by a number of (mostly ex-RAF) contract pilots.

On 17 October 1975, the Omani Hunters attacked PFLO bases inside South Yemen, supported by Imperial Iranian Navy bombardments and by Imperial Iranian Air Force fighter-bombers deployed to Oman. The serving RAF pilots were not involved in the cross-border attacks, which were flown chiefly by Britons Nigel Charles and Barry Stott, by New Zealander Stefan Karwowski and by Jordanian Mohammed Ferarj. The Hunters tended to fly 60° dive attacks from 15,000 ft (4572 m), with weapons release by 2,500 ft (762 m) followed by a 7*g* spiral up to 10,000 ft (3048 m). It was an escape manoeuvre which the SA-7 was supposed not to be able to counter.

Hawker Hunter 'FGA.Mk 9' No. 1 Squadron, Royal Rhodesian Air Force Thornhill, 1963

Rhodesia's first Hunters were a batch of 12 ex-RAF Mk 6s refurbished by HSA to a standard close to that of an RAF FGA.Mk 9. RRAF122 (formerly F.Mk 6 XG294 and a veteran of Nos 93 and II Sqns, RAF) was the seventh of the dozen aircraft, serialled RRAF116/127. Delivered in December 1963, these aircraft joined No. 1 Sqn at Thornhill, replacing Vampires. Reserialled 8122 in 1968, the aircraft was still on the books of the newly formed Air Force of Zimbabwe in 1980, but was destroyed, with nine other Hunters, during the 25 July 1982 terrorist attack on Thornhill.

FGA.Mk 9 features
Rebuilt by Hawker Siddeley to near FGA.Mk 9 standard, the RRAF's Hunters sported Mod 228 wings, were able to carry 230-Imp gal (1046-litre) fuel tanks on the inner pylons, featured 'dog tooth' leading-edge extensions and had braking parachutes installed.

Hunters in Rhodesian service
After the Unilateral Declaration of Independence by Prime Minister Ian Smith in 1965 and the formation of a Rhodesian republic in 1969, the RRAF became the Rhodesian Air Force in 1970. Throughout the 1970s RhAF Hunters joined EE Canberras engaged in attacks on ZANLA and ZIPRA guerrilla forces based in Angola, Botswana, Mozambique, Tanzania and Zambia. Though an embargo on trade with the UK placed considerable strain on the RhAF's ability to keep its aircraft flying and armed, the quality of the Hunter's refurbishment by HSA and the ingenuity of local technicians meant that most remained in service into the 1980s. After the initial stocks of weapons were exhausted, Matra SNEB rocket pods were acquired, and locally designed and manufactured weapons were deployed (including the 'Golf Bomb' air-burst weapon, a flechette bomb and the 'Frantan' napalm canister); only two aircraft were lost to AAA and small arms fire. With the formation of the Air Force of Zimbabwe in 1980 four FGA.Mk 80s and a single T.Mk 7 were acquired from Kenya.

National markings
When delivered, the aircraft wore RAF-type roundels with three vertical assegais (tribal spears) – the then-RRAF insignia, carried over from the days of the Federation of Rhodesia (Northern and Southern) and Nyasaland. When the Federation came to an end in 1963, the three assegais were replaced by a single large assegai. The Rhodesian Air Force dropped its Royal prefix in March 1970, and adopted a new green-and-white roundel in about 1973, on which the Rhodesian lion was superimposed in yellow. A green/white/green fin flash was seldom applied.

Camouflage
Rhodesia's Hunters were delivered in standard RAF camouflage, but were subsequently repainted locally with more appropriate Dark Green and Dark Earth upper surfaces, and later with the Dark Earth extending over the lower surfaces, too. The new national insignia was eventually removed from the wings to avoid compromising the camouflage.

RRAF122

Hunters for export 2: refurbished aircraft

Above: Kuwaiti Hunter FGA.Mk 57 (ex-Belgian F.Mk 6)
Below: Iraqi Hunter FGA.Mk 59 (ex-Belgian F.Mk 6)

Above: Qatari Hunter FGA.Mk 78 (ex-Dutch F.Mk 6)
Top: Singaporean Mk 74 and T.Mk 75 (ex-RAF airframes)
Below: Chilean Hunter T.Mk 72 (ex-Dutch F.Mk 6)

Upon their completion refurbished Hunters were invariably recorded on film by a Hawker Siddeley photographer prior to their departure. These views give an idea of the brisk trade being done by HSA during the 1960s/70s.

Oman lost a Strikemaster during the operation, and another was damaged. One Hunter was damaged by a SA-7 but was repaired to fight again, while another was written off as being uneconomical to repair following a hit by a 57-mm AAA round. One more Hunter took two 40-mm hits on the armoured windscreen, and another aircraft suffered an engine failure, possibly after being hit by a 14.7-mm shell. The pilot was forced to eject from this aircraft. The Omani Hunters continued flying missions against rebels inside Oman for many years, finally being replaced by BAe Hawks.

Advanced Hunters

When the RAF determined that the Hunter would be in service for another 10 years (sometime during the mid- to late 1950s), the Central Fighter Establishment produced an outline proposal for an advanced Hunter ('The CFE Hunter') with a range of possible features.

The aircraft would have only two cannon but expanded 200-round magazines and integral link collectors, a slab tail and a new powerplant. The latter would most likely have been a non-afterburning 12,650-lb st (56.26-kN) Avon 301 (the Lightning powerplant) or even a Rolls-Royce Spey. The Spey, though, would have required extra mass flow, necessitating expensive changes to the intakes. It was recognised that the Hunter could also benefit from a fuselage stretch (probably provided by a plug at the forward transport joint) to provide additional internal fuel capacity. Other features proposed or studied included low-pressure tyres, a GA.Mk 11-style 1.5*g* emergency arrester hook, an enlarged brake chute, a new navigation system and AIM-9 Sidewinders. Many of these features were also proposed to Chile and Switzerland.

The Swiss were also offered an aircraft known as the Super Hunter (or Hunter S.2 Minus), which had increased warload, greater fuel capacity, higher engine thrust, and a more accurate and comprehensive nav/attack system. The Super Hunter also incorporated higher-energy wheel brakes. The aircraft had only two cannon, but had extra hardpoints to allow the carriage of two 230-Imp gal (1046-litre) tanks and up to four 1,000-lb bombs, or up to eight 1,000-lb bombs and a pair of AIM-9 Sidewinders. The aircraft was to have featured a Saab BT9R bombing system with laser ranging, and was to incorporate a GGS Mk 8 radar ranging gunsight.

However, from the early 1960s, Hunters proposed by Kingston and Dunsfold team members that looked too capable faced opposition from an unexpected quarter. Senior figures within Hawker (later Hawker Siddeley) were extremely unwilling to back any Hunter derivative which promised to be more capable than Kingston's 'Great White Hope', the P.1127(RAF) – later the Harrier. This amused some of the old Hunter personnel, who suggested (with some justification) that an F.Mk 58A or an FR.Mk 74 represented a faster, longer-legged and harder-hitting ground attack aircraft than the Harrier as it then existed. It remained the case that modifications which enhanced the Hunter's capability were not always easy to get sanctioned by the board, even if

Above: Rhodesian 'FGA.Mk 9' (ex-RAF F.Mk 6)
Top: Indian Mk 56A (ex-RAF F.Mk 6)
Below: Abu Dhabian Mk 76A (ex-RAF airframes)

Above: Kenyan T.Mk 81 (ex-Fleet Air Arm T.Mk 8C)
Below: Saudi F.Mk 60 (ex-RAF F.Mk 6)

customers requested them. Thus, ex-Hawker personnel working for Lockheed Aircraft Services Company designed and installed centreline hardpoints and pylons on Singapore's Hunters, after it became clear that Kingston and Dunsfold would have nothing to do with such a modification. Similarly, the company refused to provide a Sidewinder modification, leaving Oman, Singapore and Switzerland to achieve this locally.

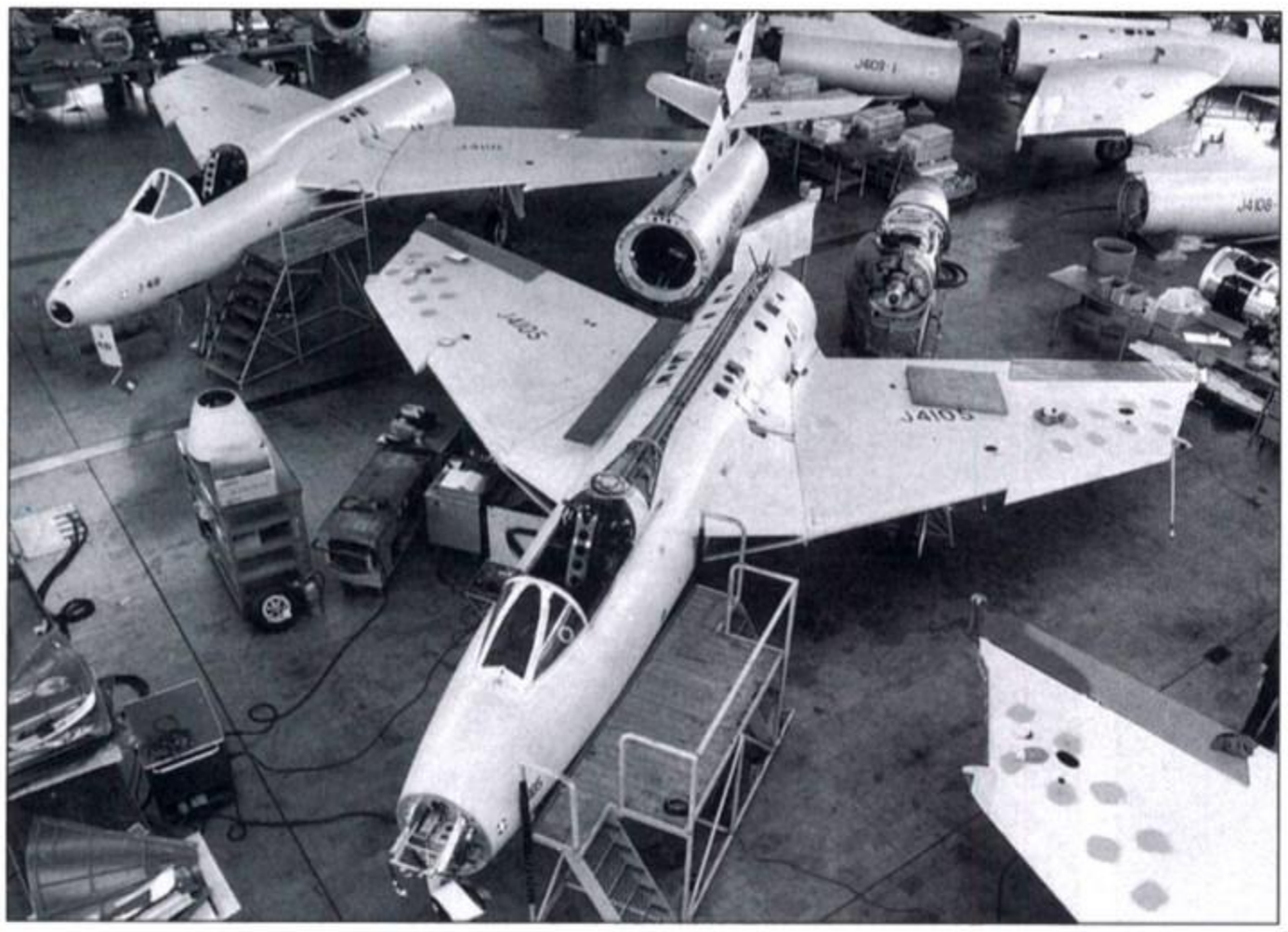
The long goodbye

In the land of its origin, the Hunter continued to serve in the advanced flying training role and proved extremely popular. To the student lucky enough to experience it, the single-seat Hunter F.Mk 6, F.Mk 6A or FGA.Mk 9 was a real fighter (albeit an obsolete one, withdrawn from the front line) and not a purpose-designed two-seat trainer. The fact that it was a single-seater was psychologically important, helping to reinforce the young pilot's confidence and morale.

At No. 4 FTS at Valley, Hunters augmented the unit's diminutive Gnats, equipping No. 3 Training Squadron. This unit was located on the far side of the airfield, away from the rest of the school and close to the beach. Its isolation and unique equipment and role reportedly ensured that it enjoyed a more relaxed and informal atmosphere. The task was to train overseas students and pilots who were too big to comfortably fit into the diminutive Gnat; if any slots were left, the unit also accommodated "anyone who lucked into it!" according to one envious former No. 4 FTS Gnat student. "They converted on Hunter T.Mk 7s and then flew stripped-down Hunter Sixes (we called them GT 6s) which had superb performance and beautiful handling."

Initially painted in standard camouflage, from 1973 the No. 4 FTS Hunters were painted in high-visibility 'raspberry ripple' Training Command red, white and grey, making them arguably the prettiest Hunters ever operated by the Royal Air Force. No. 3 Squadron even briefly operated an F.Mk 6 aerobatic team, called the 'Dragons'. The Hunters operated by No. 4 FTS disappeared at much the same time as the Gnats, replaced by BAe Hawks from 1976.

Long after the type had been withdrawn from front-line squadrons, Hunters also remained in use for the next phase of flying training, turning the neophyte fast-jet pilots who emerged from Valley into fledgling fighter pilots. No. 229 OCU remained active long after the requirement for front-line Hunter pilots disappeared, and the unit's role subtly shifted from operational type conversion on the Hunter to provision of a more general operational tactics and weapons training for pilots destined for other front-line fast-jet types. No. 229 OCU had long been used to prepare pilots destined for the Lightning, so the role was not entirely unfamiliar. As a matter of historical record, the last No. 229 OCU student to graduate to a front-line Hunter squadron (apart from those who went to the two 'ground attack pilot pool' units described later in this narrative) was one Flight Lieutenant Griffiss, who celebrated the successful end of his course in November 1970. From then, the destination of



J-4105 and some of its brethren undergo reassembly at F+W's Emmen works. In 1982 many of these aircraft returned to the same facility for upgrading under the 'Hunter-80' programme.

Swiss Hunters

During the early 1970s, after the first 100 aircraft (Mk 58s comprising 12 new F.Mk 6s from RAF production and 88 new-build examples), the Swiss air force took delivery of two batches of 30 and 22 aircraft to Mk 58A standard and eight Avon 200-engined T.Mk 68s. All 60 aircraft were refurbished by HSA and shipped in kit-set form to Federal Aircraft Factory (F+W from 1972) of Emmen for final assembly.

No. 229 OCU's successful graduates were the Lightning, Phantom and later Jaguar OCUs.

In his superb book *F-4 Phantom, A Pilot's Story* (Cassell, 1979), Robert Prest described the Hunter's place in the RAF training regimen of the 1970s. "Hawker Hunter. To the man in the street, 1950s, Farnborough Air Show, hot summer days, Neville Duke, sleek airframe, shiny silver and occasionally virgin white, here and gone in a Doppler wave of howling Avon (the famous 'Blue Note') or perhaps just a pencil-thin trail of white vapour bisecting the heaven, from one horizon through the zenith and on to the other. Or maybe sixteen of the breed, black and 'Treble One', masters of the art of mass formation aerobatics wheeling in a diamond wedge, toylike, cohesive, graceful above the popcorn-munching crowds gazing up in admiration at those magnificent men in their magnificent machines.

"To me, 1972, Hawker Siddeley Hunter, obsolescent, ergonomic nightmare of haphazard instrumentation, illogical positioning of booster pump switches, UHF radio set, G4 compass, inverter circuit breakers, temperamental starter motors, oil- and hydraulic-streaked dirty grey belly, bug-spattered windscreen and flaking drab paintwork. Yet it is functional and purposeful, an ageing lady no longer beautiful but still unique, retaining its nostalgic charisma and reminiscing on past glories as steely new breeds thunder overhead, vaunting their afterburners."

From No. 229 OCU to TWU

The changed role of No. 229 OCU was reflected in a belated change of designation to the Tactical Weapons Unit, when the unit moved to RAF Brawdy in 1974. The TWU had the same shadow squadrons as No. 229 OCU – Nos 63, 79 and 234 - and little changed in the way the unit was run. The unit inherited No. 229 OCU's fleet of T.Mk 7s, F.Mk 6s and FGA.Mk 9s. The move to Brawdy also prompted the birth of a new Hunter variant, the F.Mk 6A (although this designation had earlier been applied, perhaps unofficially, to the original interim FGA.Mk 9s).

With its lack of suitable diversion airfields and poor weather record, it soon became clear that Brawdy was not well suited to operating Hunter F.Mk 6s, and that the provision of the larger 230-Imp gal (1046-litre)tanks would be beneficial. Simply reinforcing the hardpoints was not sufficient: if big tanks were to be carried, the Hunter needed a brake parachute, and the flaps had to be cut away to

Switzerland's unique system of* Kavernen *(below right, in a photograph dated 22 April 1969) housed a large proportion of its Hunter fleet. In times of crisis nearby motorways are closed and employed as runways for the 'sleeping squadrons' housed in these facilities; regular exercises are held to practise such deployments.

Hunter Mk 58A J-4117 was one of the first batch of 30 refurbished aircraft delivered in the early 1970s and was converted from an ex-RAF Mk 4. Unusually, two of these aircraft were former T.Mk 7 two-seaters originally built by Fokker for the KLu.

Lower left: Eight T.Mk 68 trainers were supplied to the Swiss. These were a mixture of former Swedish Mk 50s and RAF Mk 4s rebuilt with the two-seat cockpit and 'big bore' Avons. The serials J-4201/4208 were allocated to these aircraft.

prevent them from catching the tanks. The inboard pylon was fitted with an ejector release unit, unlike the original electro-magnetic release unit fitted to most F.Mk 6s and T.Mk 7s. This allowed easier jettisoning of the larger tanks. By the time the aircraft were converted, all F.Mk 6s and FGA.Mk 9s had the Avon 207 engine (the FGA.Mk 9 powerplant). The F.Mk 6A was thus virtually an FGA.Mk 9 by the time conversion was complete.

Mk 6As and 'GT 6s'

Twenty-four Hunter F.Mk 6As were modified by Hawker Siddeley Contractor's Working Parties at Brawdy between February 1975 and mid-1976. Conversion took one month per aircraft, two aircraft being worked on simultaneously. Conversion entailed taking the wings off, so several aircraft received mainplane changes and some aircraft which had been grounded after AVPIN explosions (which tended to collapse the intakes) were returned to airworthy condition. The aircraft usually went straight from conversion into scheduled maintenance, sometimes Minor Star servicing at Brawdy, sometimes a Major at St Athan, and sometimes a respray at Kemble. A handful of F.Mk 6s (perhaps only a pair of which, XE656 and XG164, remained in use) were not modified, and became known as 'GT 6s' (after the famous Triumph sports car of the day), since they tended to fly without tanks and could not carry the heavy, draggy FGA.Mk 9 big tanks.

Courses began to overrun, due to Brawdy's notoriously poor weather. This reduced the throughput of pilots to the front line, just as the demand for fast-jet aircrew began to increase. In response, the TWU divided into two separate parallel units: the Brawdy-based element became No. 1 TWU on 31 July 1978, and a new No. 2 TWU formed at Lossiemouth the same day upon the transfer of 30 Hunters to the Morayshire base.

Although RAF Training Command had successfully operated two different types for advanced training and tactical weapons training (the Gnat and the Hunter), this did necessitate converting students to an entirely new aircraft type prior to the tactical phase of training. It was always intended that the RAF's Gnat replacement would also replace Hunters in the tactical training role.

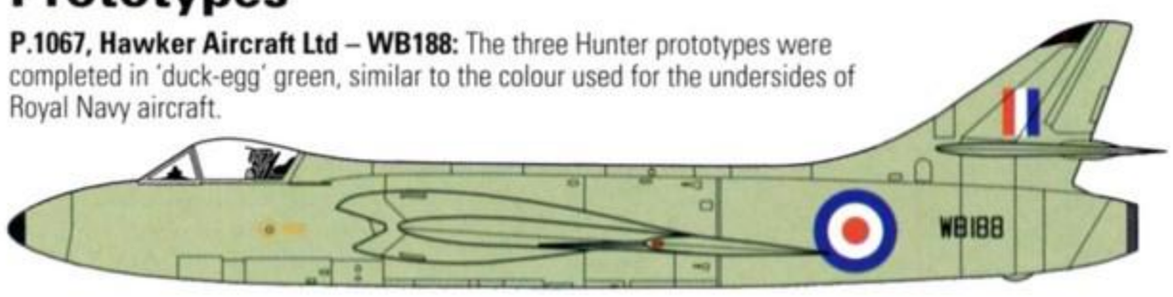
The Hawk began to enter service at Brawdy in 1978, initially being used for instructor training and standardisation. The Hawk had entered service with No. 234 Squadron in May 1978, and No. 63 Squadron followed, graduating its last Hunter course in May 1979. Thereafter, *ab initio* pilots posted to Brawdy all trained on the Hawk, and only QWIs, foreign students and refreshers flew the Hunters, which were concentrated within No. 79 Squadron. No. 2 TWU retained Hunters for the whole of the time it was based at Lossiemouth, but subsequently disbanded on 1 April 1981. It reformed at Chivenor the same day, where Hawks had begun operating on 7 August 1980.

Beginning in 1982, the 'Hunter-80' programme was the most ambitious of the Swiss upgrades, F+W rebuilding Mk 58/58As with provision for the carriage of AGM-65B Maverick ASMs on new outboard hardpoints. Other modifications included the fitting of chaff/flare dispensers in the rearward section of the link/shellcase collectors and RWR antennas either side of the nose. J-4083 (below) is one of the 'Hunter-80' aircraft; not all surviving Hunters were upgraded, the remaining original aircraft becoming the first retirees in 1994. That year also marked the 30th anniversary of the Swiss Hunter display team 'La Patrouille Suisse', which decorated its aircraft to mark the occasion (left).

Hunter colours

Prototypes

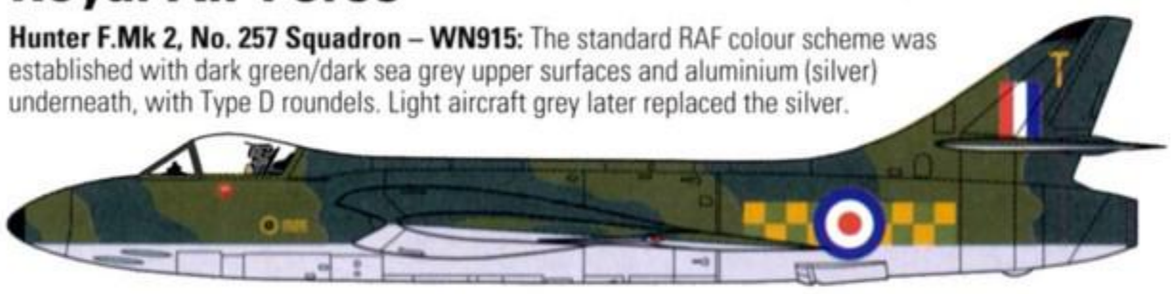
P.1067, Hawker Aircraft Ltd – WB188: The three Hunter prototypes were completed in 'duck-egg' green, similar to the colour used for the undersides of Royal Navy aircraft.



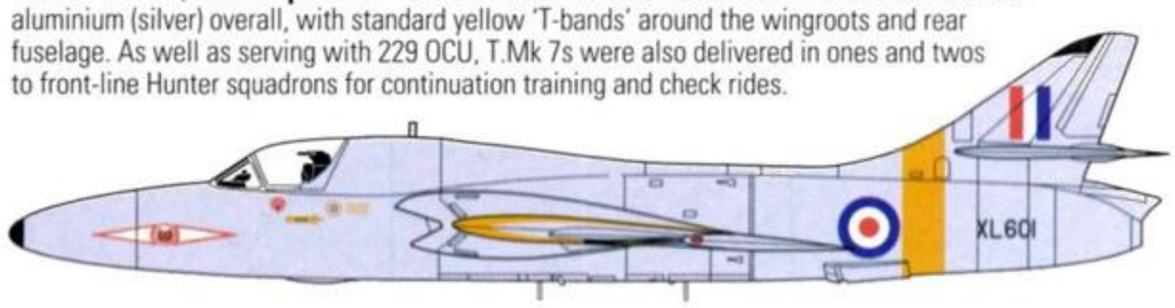
Hunter F.Mk 3, Hawker Aircraft Ltd – WB188: After modification for the successful attempt on the World Speed Record with an afterburning Avon, the prototype Hunter (by then designated as an F.Mk 3) was painted bright red and featured a 'high-speed' swept fin-flash.

Royal Air Force

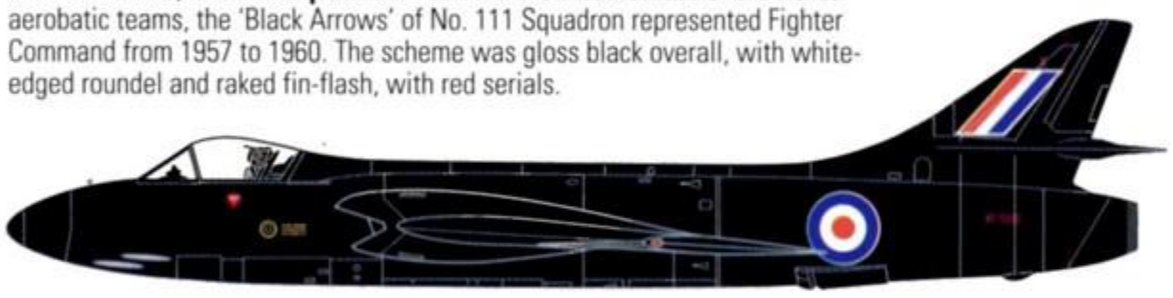
Hunter F.Mk 2, No. 257 Squadron – WN915: The standard RAF colour scheme was established with dark green/dark sea grey upper surfaces and aluminium (silver) underneath, with Type D roundels. Light aircraft grey later replaced the silver.



Hunter T.Mk 7, No. 1 Squadron – XL601: The initial scheme for the RAF's two-seaters was aluminium (silver) overall, with standard yellow 'T-bands' around the wingroots and rear fuselage. As well as serving with 229 OCU, T.Mk 7s were also delivered in ones and twos to front-line Hunter squadrons for continuation training and check rides.



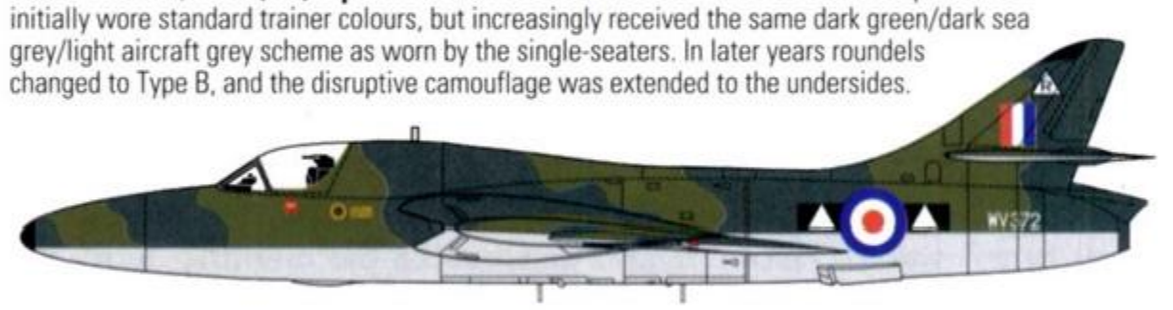
Hunter F.Mk 6, No. 111 Squadron – XF506: The most famous of the Hunter aerobatic teams, the 'Black Arrows' of No. 111 Squadron represented Fighter Command from 1957 to 1960. The scheme was gloss black overall, with white-edged roundel and raked fin-flash, with red serials.



Hunter T.Mk 7, No. 229 Operational Conversion Unit – XL579: To increase conspicuity, trainer Hunters had Dayglo 'T-bands' applied in place of yellow. This then gave way to this scheme which featured Dayglo strips applied more liberally to the aluminium. Light aircraft grey subsequently replaced the aluminium. This aircraft wears its No. 234 Sqn 'shadow' marking behind the cockpit.

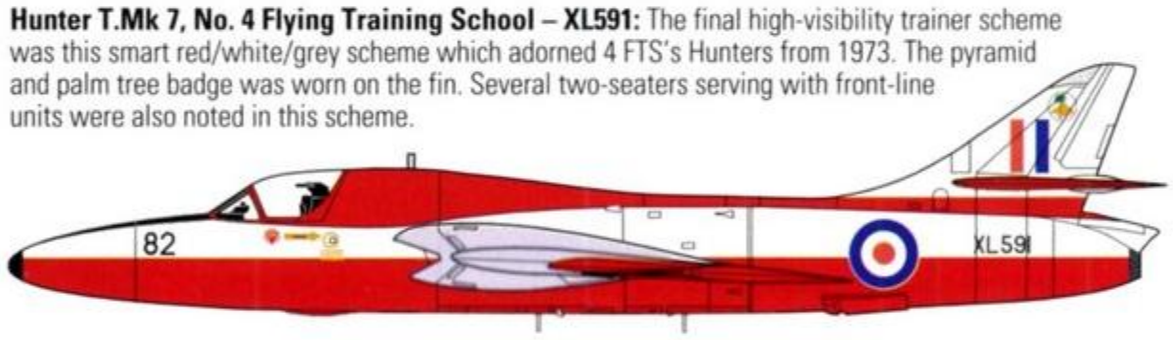
Hunter F.Mk 6, No. 92 Squadron – XF520 : The 'Blue Diamonds' of No. 92 Squadron followed the 'Black Arrows' as the Fighter Command display team for 1961/62. The Hunters were painted royal blue overall, with white wingtips and a cheat line. The squadron's cobra/maple leaf badge and red/yellow check bars were presented on the nose.

Hunter T.Mk 7, No. II(AC) Squadron – WV372: T.Mk 7s allocated to front-line squadrons initially wore standard trainer colours, but increasingly received the same dark green/dark sea grey/light aircraft grey scheme as worn by the single-seaters. In later years roundels changed to Type B, and the disruptive camouflage was extended to the undersides.

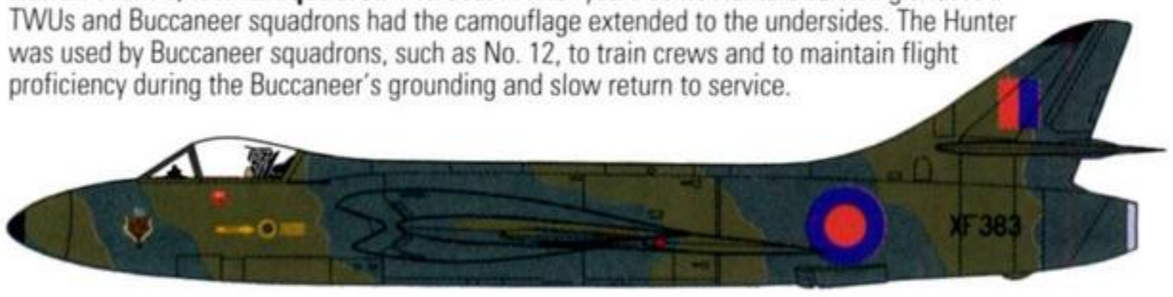


Hunter FGA.Mk 9, No. 58 Squadron – XG207: While the dark green/dark sea grey upper surfaces remained standard throughout the Hunter's RAF career, the undersides changed from aluminium to light aircraft grey, and roundels changed to Type B. This aircraft wears the owl badge of No. 58 Sqn, when the unit was at Wittering in 1975.

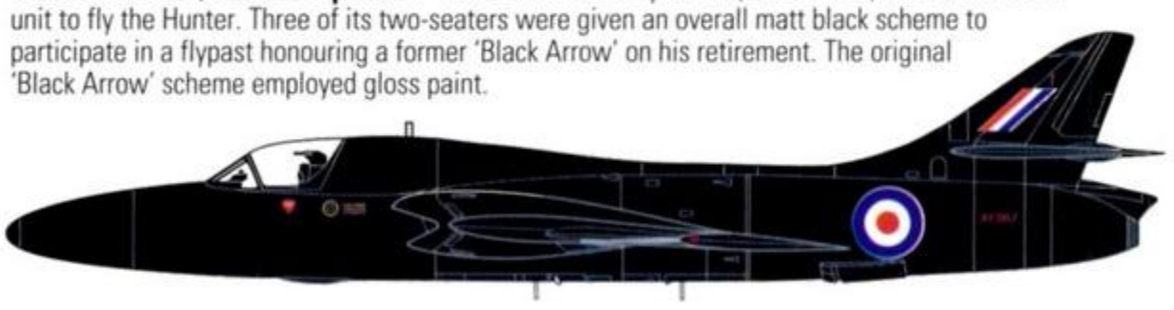
Hunter T.Mk 7, No. 4 Flying Training School – XL591: The final high-visibility trainer scheme was this smart red/white/grey scheme which adorned 4 FTS's Hunters from 1973. The pyramid and palm tree badge was worn on the fin. Several two-seaters serving with front-line units were also noted in this scheme.



Hunter F.Mk 6, No. 12 Squadron – XF383: In later years some Hunters surviving with RAF TWUs and Buccaneer squadrons had the camouflage extended to the undersides. The Hunter was used by Buccaneer squadrons, such as No. 12, to train crews and to maintain flight proficiency during the Buccaneer's grounding and slow return to service.



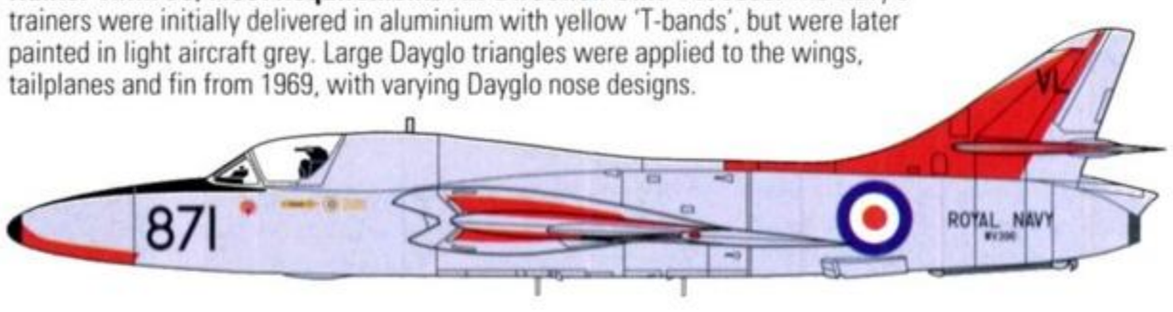
Hunter T.Mk 8B, No. 208 Squadron – XF967: No. 208 Squadron (Buccaneers) was the last RAF unit to fly the Hunter. Three of its two-seaters were given an overall matt black scheme to participate in a flypast honouring a former 'Black Arrow' on his retirement. The original 'Black Arrow' scheme employed gloss paint.



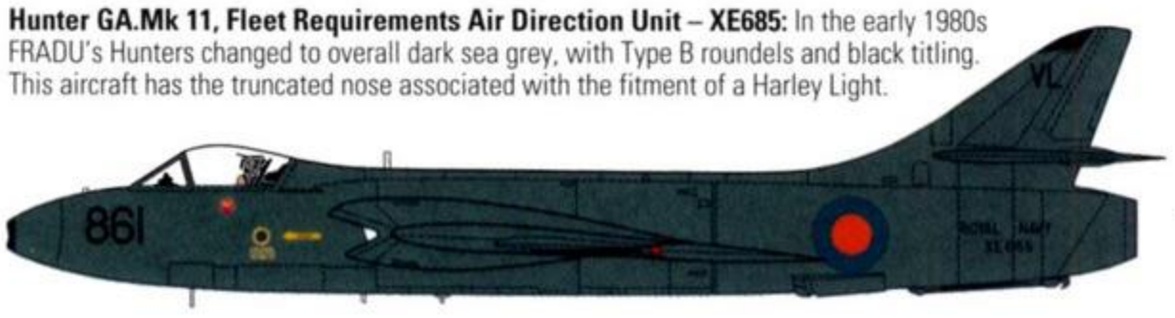
Royal Navy

Hunter GA.Mk 11, Fleet Requirements Air Direction Unit – XF301: Single-seat Mk 11s for the Navy were delivered in dark sea grey upper surfaces and white undersides, with Type D roundels and white titling.

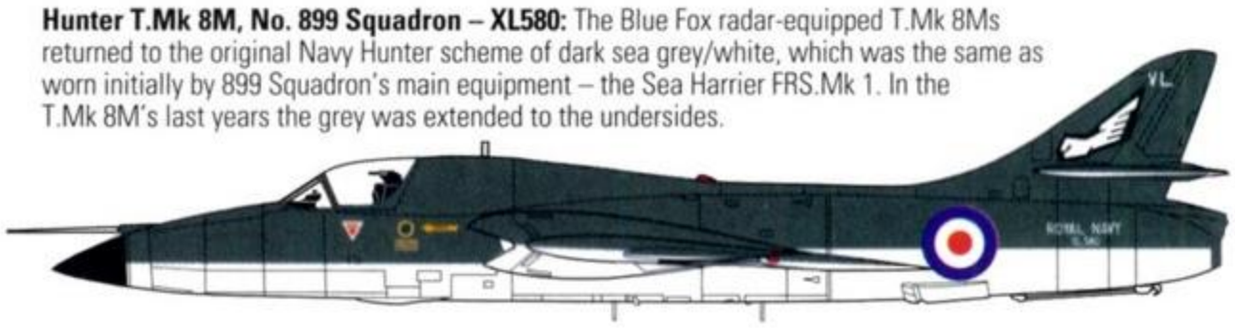
Hunter T.Mk 8C, Fleet Requirements Air Direction Unit – WV396: The Navy's trainers were initially delivered in aluminium with yellow 'T-bands', but were later painted in light aircraft grey. Large Dayglo triangles were applied to the wings, tailplanes and fin from 1969, with varying Dayglo nose designs.



Hunter GA.Mk 11, Fleet Requirements Air Direction Unit – XE685: In the early 1980s FRADU's Hunters changed to overall dark sea grey, with Type B roundels and black titling. This aircraft has the truncated nose associated with the fitment of a Harley Light.

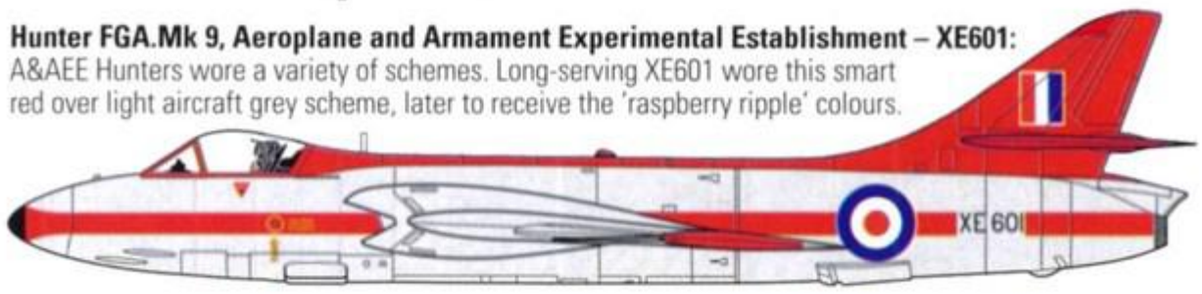


Hunter T.Mk 8M, No. 899 Squadron – XL580: The Blue Fox radar-equipped T.Mk 8Ms returned to the original Navy Hunter scheme of dark sea grey/white, which was the same as worn initially by 899 Squadron's main equipment – the Sea Harrier FRS.Mk 1. In the T.Mk 8M's last years the grey was extended to the undersides.



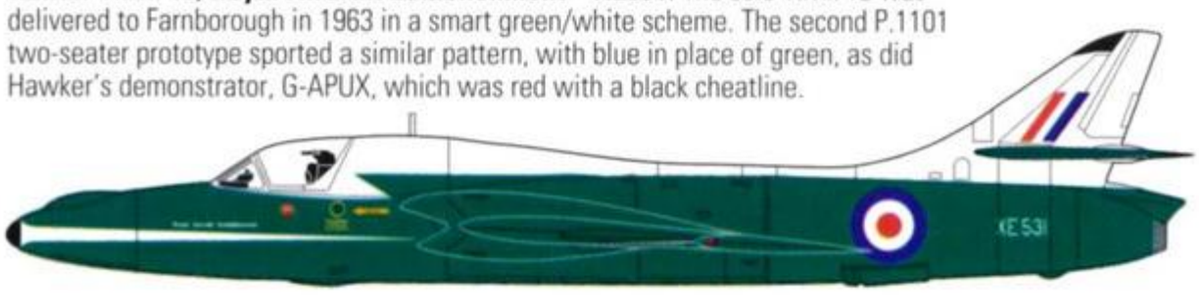
UK – other operators

Hunter FGA.Mk 9, Aeroplane and Armament Experimental Establishment – XE601: A&AEE Hunters wore a variety of schemes. Long-serving XE601 wore this smart red over light aircraft grey scheme, later to receive the 'raspberry ripple' colours.



Hunter T.Mk 7, Empire Test Pilots School – XL564: Known as 'raspberry ripple', this scheme was adopted as standard by MoD(PE) aircraft in the early 1980s. The ETPS had two T.Mk 7s on charge for spin training.

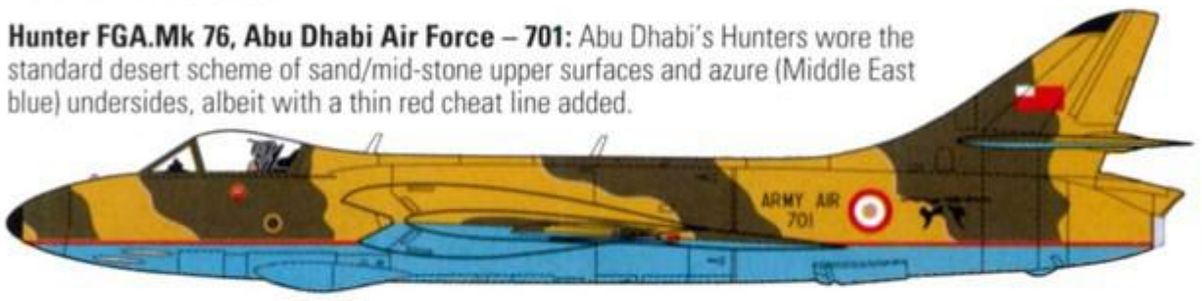
Hunter T.Mk 12, Royal Aircraft Establishment – XE531: The sole T.Mk 12 was delivered to Farnborough in 1963 in a smart green/white scheme. The second P.1101 two-seater prototype sported a similar pattern, with blue in place of green, as did Hawker's demonstrator, G-APUX, which was red with a black cheatline.



Hunter F.Mk 51, private owner – G-HUNT: Most privately-owned 'warbird' Hunters have flown in military-style markings, but a small number have had colourful schemes applied. The UK's first civilian Hunter, an ex-Danish aircraft, received this vivid red scheme.

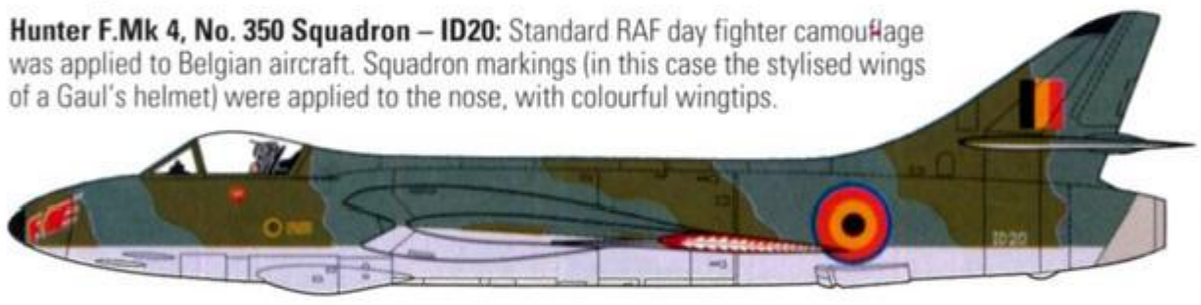
Abu Dhabi

Hunter FGA.Mk 76, Abu Dhabi Air Force – 701: Abu Dhabi's Hunters wore the standard desert scheme of sand/mid-stone upper surfaces and azure (Middle East blue) undersides, albeit with a thin red cheat line added.



Belgium

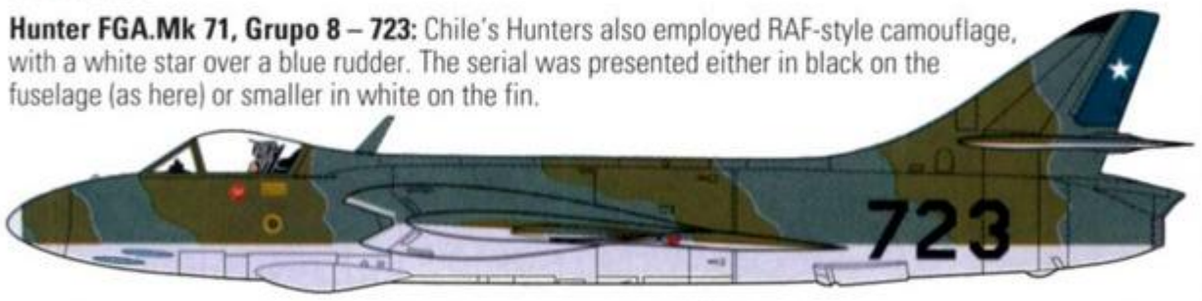
Hunter F.Mk 4, No. 350 Squadron – ID20: Standard RAF day fighter camouflage was applied to Belgian aircraft. Squadron markings (in this case the stylised wings of a Gaul's helmet) were applied to the nose, with colourful wingtips.



Hunter F.Mk 6, 7th Wing – IF73: The 7th Wing's aerobatic team, the 'Rode Duivels'/'Diables Rouges', applied a smart overall red scheme with white cheat line, oversized fin-flash and red/white checkered wingtips. At its peak the team had 16 aircraft assigned.

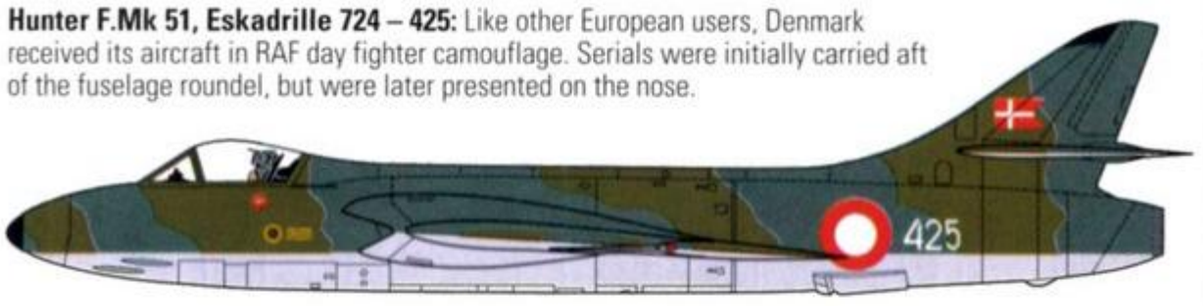
Chile

Hunter FGA.Mk 71, Grupo 8 – 723: Chile's Hunters also employed RAF-style camouflage, with a white star over a blue rudder. The serial was presented either in black on the fuselage (as here) or smaller in white on the fin.



Denmark

Hunter F.Mk 51, Eskadrille 724 – 425: Like other European users, Denmark received its aircraft in RAF day fighter camouflage. Serials were initially carried aft of the fuselage roundel, but were later presented on the nose.



Hunter T.Mk 53, Eskadrille 724 – ET-271: The final Danish Hunter scheme employed an overall olive drab with reduced-size national insignia and black markings. On some aircraft the squadron badge was applied, in decal form, below the windscreen.

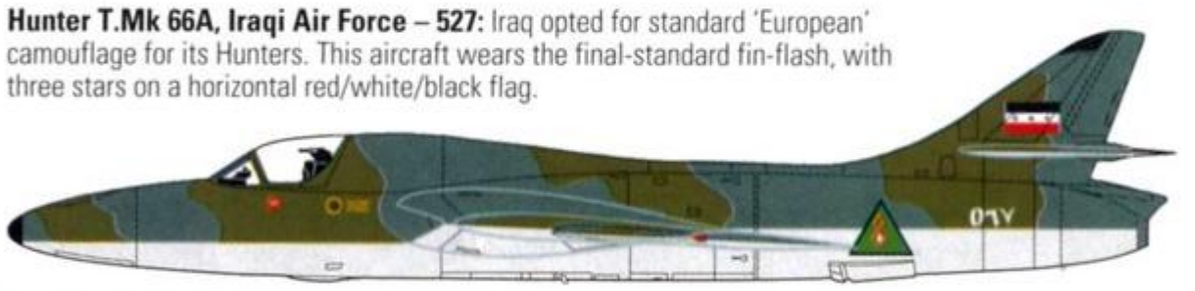
India

Hunter F.Mk 56, No. 20 Squadron – BA350: Indian Hunters also employed RAF colour schemes, with silver undersides, and serials presented in a similar position and size on the aft fuselage. Squadron badges were sometimes worn on the nose.

Hunter F.Mk 56, No. 20 Squadron – A484: Perhaps the most striking of all Hunter schemes was that employed by the 'Thunderbolts', No. 20 'Lightning' Sqn's aerobatic team. The overall blue was liberally adorned with white lightning bolts with the squadron badge or number in the small white circle on the nose.

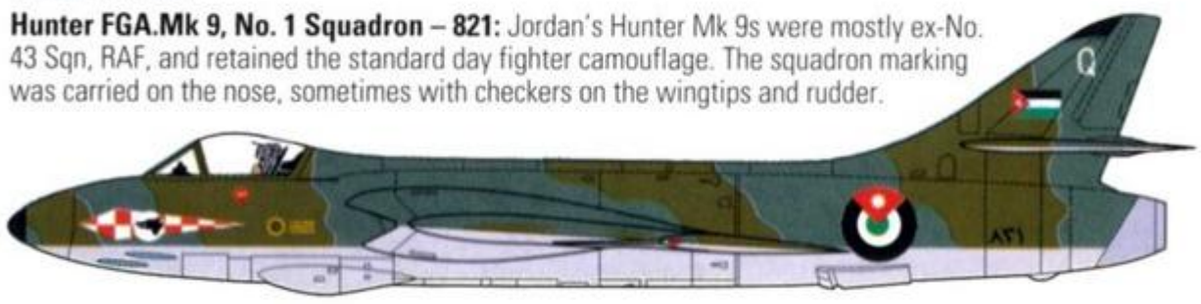
Iraq

Hunter T.Mk 66A, Iraqi Air Force – 527: Iraq opted for standard 'European' camouflage for its Hunters. This aircraft wears the final-standard fin-flash, with three stars on a horizontal red/white/black flag.



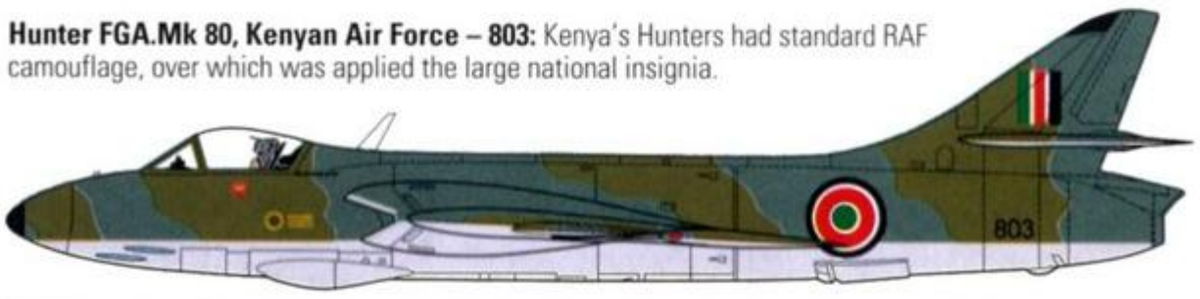
Jordan

Hunter FGA.Mk 9, No. 1 Squadron – 821: Jordan's Hunter Mk 9s were mostly ex-No. 43 Sqn, RAF, and retained the standard day fighter camouflage. The squadron marking was carried on the nose, sometimes with checkers on the wingtips and rudder.



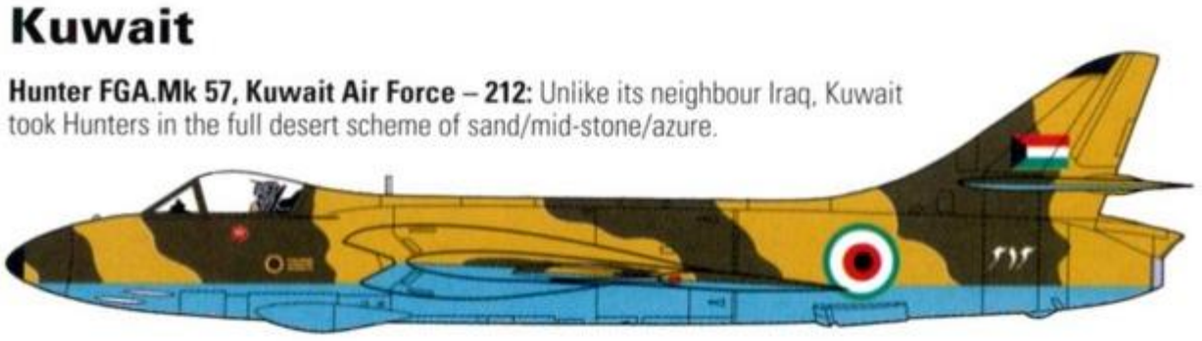
Kenya

Hunter FGA.Mk 80, Kenyan Air Force – 803: Kenya's Hunters had standard RAF camouflage, over which was applied the large national insignia.



Kuwait

Hunter FGA.Mk 57, Kuwait Air Force – 212: Unlike its neighbour Iraq, Kuwait took Hunters in the full desert scheme of sand/mid-stone/azure.



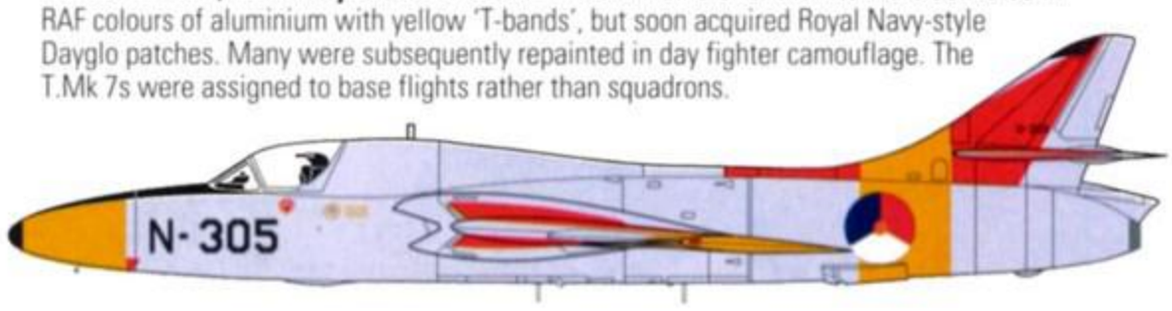
Lebanon

Hunter FGA.Mk 70A, Force Aérienne Libanaise – L280: Lebanon's Hunters have retained RAF camouflage throughout. The serial is worn in Arabic script on the starboard side.

Netherlands

Hunter F.Mk 4, No. 322 Squadron – N-111: Dutch Hunters wore RAF camouflage. No. 322 Squadron applied this tail marking, based on a West Irian flag, when it deployed to Biak, Dutch New Guinea, in 1960.

Hunter T.Mk 7, Koninklijke Luchtmacht– N-305: Trainers for the KLu were delivered in RAF colours of aluminium with yellow 'T-bands', but soon acquired Royal Navy-style Dayglo patches. Many were subsequently repainted in day fighter camouflage. The T.Mk 7s were assigned to base flights rather than squadrons.



Oman

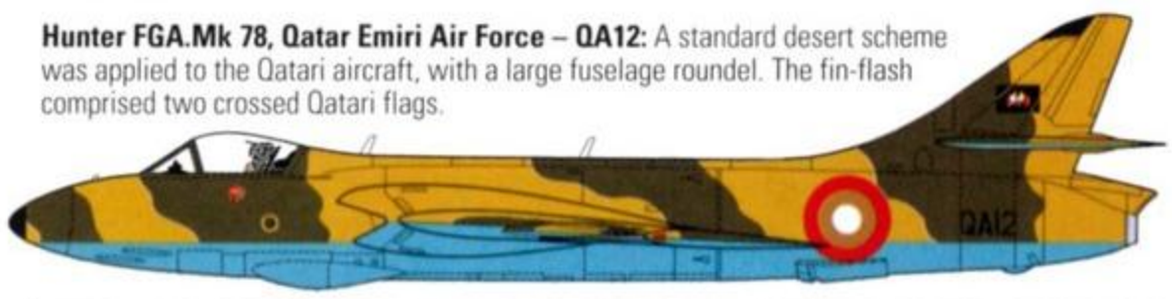
Hunter FGA.Mk 73, No. 6 Squadron – 847: Oman's Hunters originally wore RAF day fighter camouflage before adopting the standard desert scheme. Many were later repainted in a modern two-tone grey scheme with toned-down markings.

Peru

Hunter F.Mk 52, Escuadrón de Caza 14 – 638: RAF day fighter camouflage again ruled the day in Peru, although the oversized fin-flash made a colourful addition to the dark green/dark sea grey/aluminium.

Qatar

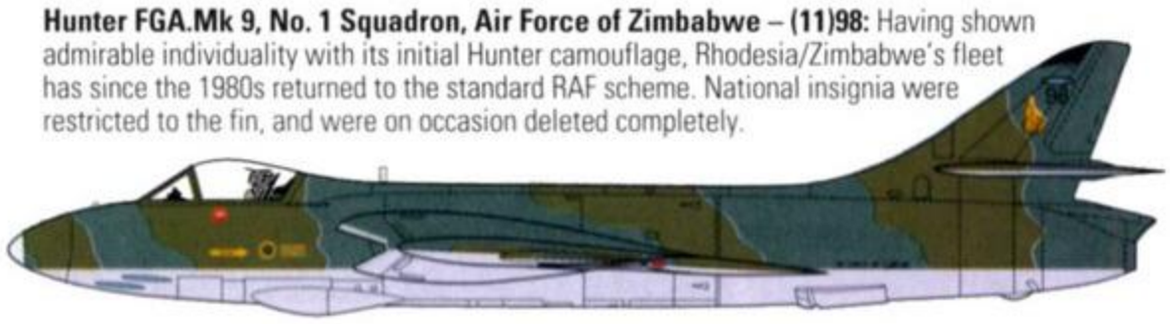
Hunter FGA.Mk 78, Qatar Emiri Air Force – QA12: A standard desert scheme was applied to the Qatari aircraft, with a large fuselage roundel. The fin-flash comprised two crossed Qatari flags.



Rhodesia/Zimbabwe

Hunter FGA.Mk 9, No. 1 Squadron, Rhodesian Air Force – R1821: Rhodesia was unusual in acquiring aircraft with a dark green/dark earth disruptive upper camouflage, the dark earth extending to the undersides.

Hunter FGA.Mk 9, No. 1 Squadron, Air Force of Zimbabwe – (11)98: Having shown admirable individuality with its initial Hunter camouflage, Rhodesia/Zimbabwe's fleet has since the 1980s returned to the standard RAF scheme. National insignia were restricted to the fin, and were on occasion deleted completely.

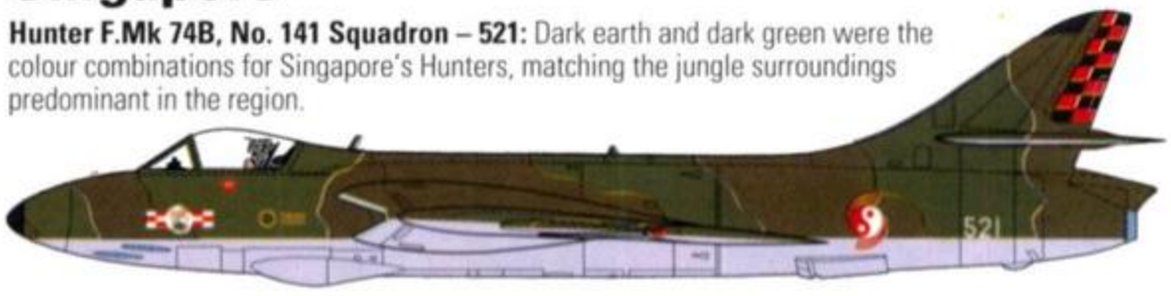


Saudi Arabia

Hunter F.Mk 6, Royal Saudi Air Force – 60-602: The four Saudi Mk 6s were painted in the standard desert scheme, to which was applied markings in green. The serial was worn on the nose in both Western and Arabic scripts.

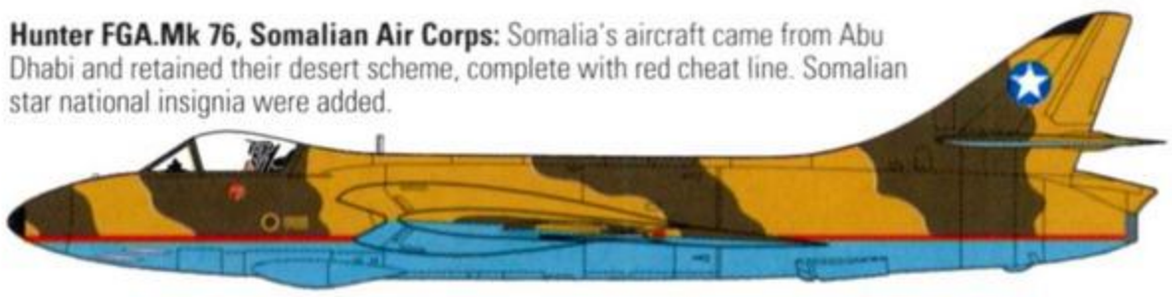
Singapore

Hunter F.Mk 74B, No. 141 Squadron – 521: Dark earth and dark green were the colour combinations for Singapore's Hunters, matching the jungle surroundings predominant in the region.



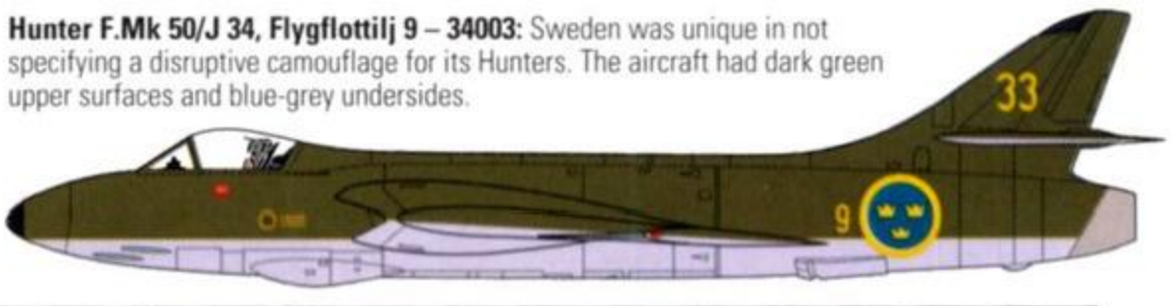
Somalia

Hunter FGA.Mk 76, Somalian Air Corps: Somalia's aircraft came from Abu Dhabi and retained their desert scheme, complete with red cheat line. Somalian star national insignia were added.



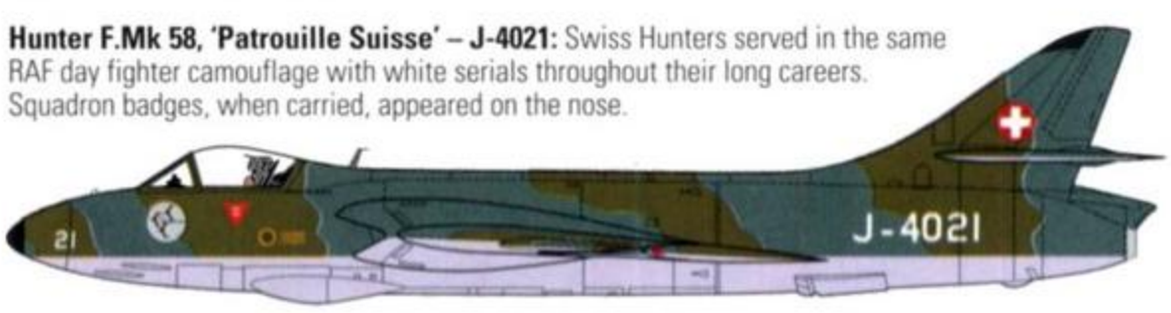
Sweden

Hunter F.Mk 50/J 34, Flygflottilj 9 – 34003: Sweden was unique in not specifying a disruptive camouflage for its Hunters. The aircraft had dark green upper surfaces and blue-grey undersides.

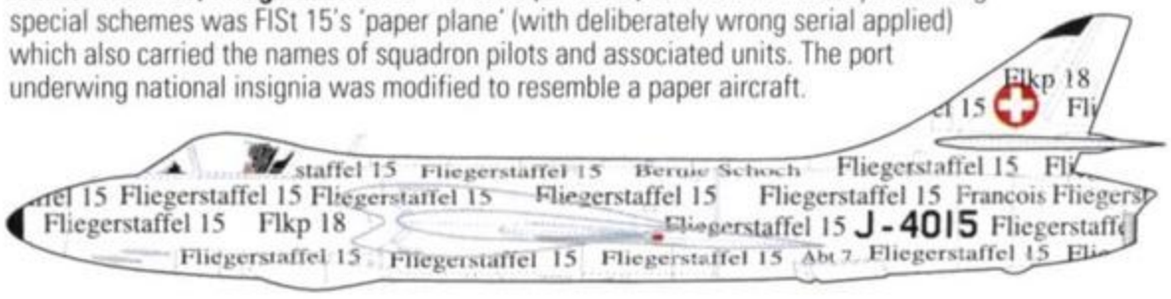


Switzerland

Hunter F.Mk 58, 'Patrouille Suisse' – J-4021: Swiss Hunters served in the same RAF day fighter camouflage with white serials throughout their long careers. Squadron badges, when carried, appeared on the nose.

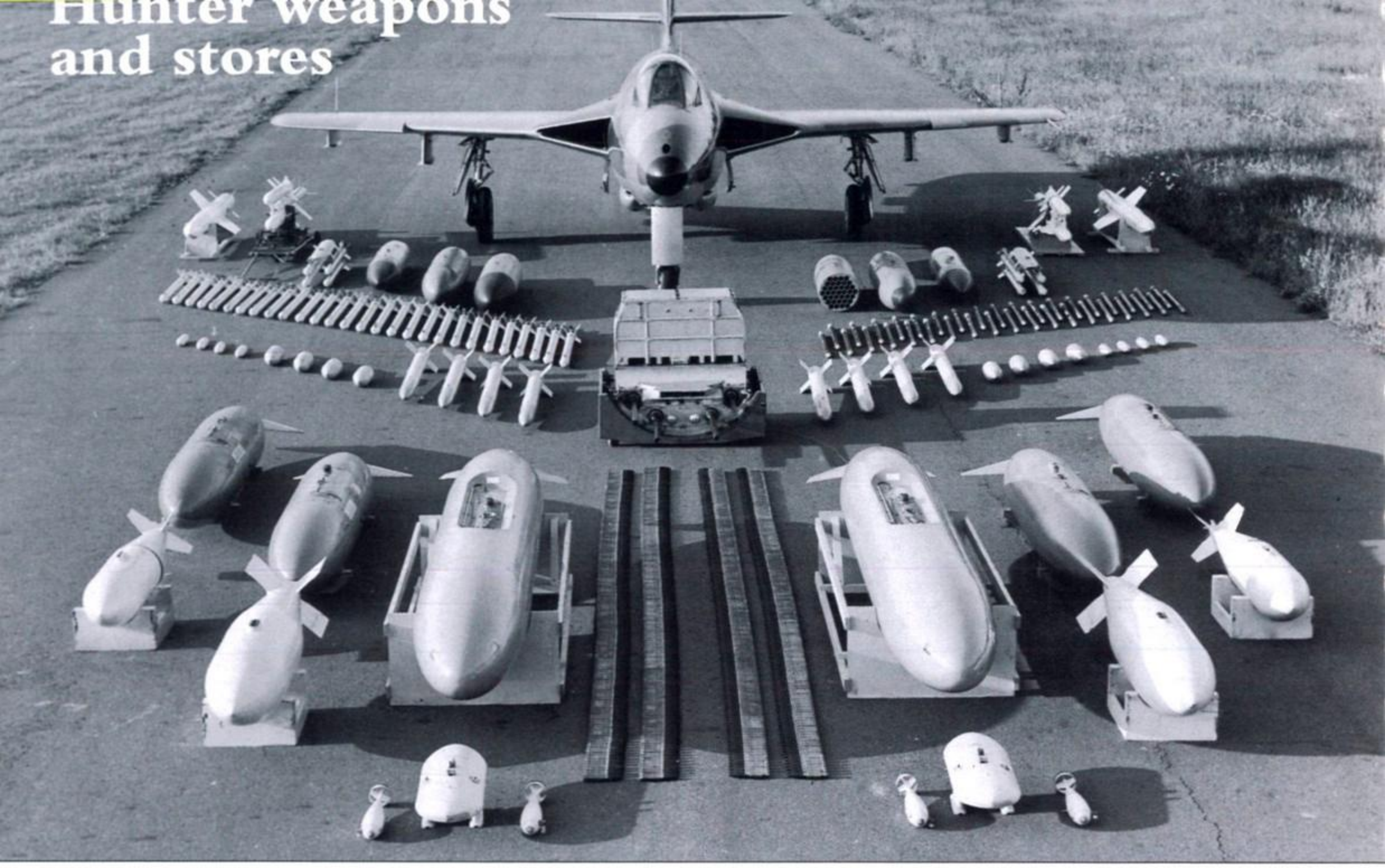


Hunter F.Mk 58, Fliegerstaffel 15 – J-4040 ('J-4015'): One of the most eye-catching special schemes was FISt 15's 'paper plane' (with deliberately wrong serial applied) which also carried the names of squadron pilots and associated units. The port underwing national insignia was modified to resemble a paper aircraft.



While the actual colours were altered (dark green/medium sea grey – as on this Swiss F.Mk 58, sand/stone or dark green/dark earth) the basic disruptive pattern of the upper surface camouflage was similar across virtually all Hunter operators.

Hunter weapons and stores



With the introduction of a second pair of underwing pylons, the Hunter with a Mod 228 wing was able to carry an array of, mainly, air-to-ground ordnance. This Hawker publicity photograph clearly represented something of a 'wish list' for the aircraft; neither of the air-to-air missiles shown was ever carried by a service aircraft.

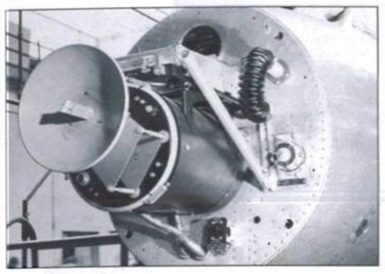
Right: Unguided rockets, of both the rail-mounted and podded variety, have been an important ground-attack weapon for the Hunter. This Indian Air Force aircraft, photographed in 1999, carries a SNEB-type pod.

Perhaps the most sophisticated Hunters, in terms of their weapons capability, were the upgraded Swiss 'Hunter-80' aircraft. These were able to carry an array of stores, including guided weapons and chaff/flare dispensers (below). A practice bomb dispenser (below right) was also a new feature. This was capable of carrying two 'bombs' of varying weight.

Most Hunter pilots were entirely reliant on the Hunter's ADEN cannon for air-to-air combat. Rearming required the removal of the entire gun pack (above). The Hunter's early service was hampered by problems with gun gas ingestion. Gas diffusers were accordingly designed; that for the two-seaters is shown (above left). A few operators modified their aircraft locally to carry AIM-9 Sidewinder AAMs (above, far left); Hawker did not offer any such option and the RAF, though promised AAMs for its Hunters, never received them.

Below: DERA Hunter XE601 carried a pair of large pods, believed to be used to spray water in chemical warfare exercises.

Hunter details



Left: A small gun-laying radar set was housed in the nose of most Hunters. This was removed from unarmed aircraft, like the GA.Mk 11 and replaced with a ballast weight in order to maintain the aircraft's centre-of-gravity. Aircraft employed for AAM testing carried an AI radar set in an enlarged nose radome.

The Hunter was dependent on underwing tanks; 100-Imp gal (455-litre, above) and 230-Imp gal (1046-litre) tanks were standard.

The 'big-bore' Avon 200-series engine transformed the Hunter's performance. This is an Avon 203, as fitted to Swiss Hunter Mk 58s.

Right: In order to accommodate the larger non-jettisonable 230-Imp gal fuel tank, the Hunter FGA.Mk 9 and derivatives were fitted with modified flaps incorporating a 'cut out' in their trailing edge. Control surface design remained virtually unchanged throughout the type's production life. A blown flap was tested on a Hunter Mk 1 but did not reach production.

Right: All Hunter pilots were strapped into a Martin-Baker ejection seat. This is a Mk 3H seat, as fitted to a Swiss Hunter Mk 58.

Below: As part of the 'Hunter-80' upgrade, Swiss Hunters were equipped with a chaff/flare dispenser in an elongated ammunition link collector.

Hunter FGA.Mk 9 cutaway drawing

1 Radome
2 Radar scanner dish
3 Ram air intake
4 Camera port
5 Radar ranging equipment
6 Camera access panel
7 Gun camera
8 Ground pressurisation connection
9 Nosewheel door
10 Oxygen bottles
11 IFF aerial
12 Electronics equipment
13 Nosewheel bay
14 De-icing fluid tank
15 Pressurisation control valves
16 Cockpit front bulkhead
17 Nose landing gear leg
18 Nosewheel forks
19 Forward retracting nosewheel
20 Nosewheel leg door
21 Cannon muzzle port
22 Gun blast cascade deflectors
23 Rudder pedals
24 Bulletproof windscreen
25 Cockpit canopy framing
26 Reflector gunsight
27 Instrument panel shroud
28 Control column
29 Cockpit section fuselage frames
30 Rearward sliding cockpit canopy cover
31 Pilot's starboard side console
32 Martin Baker Mk 3H ejection seat
33 Throttle control
34 Pilot's port side console
35 Cannon barrel tubes
36 Pneumatic system air bottles
37 Cockpit canopy emergency release
38 Cockpit rear pressure bulkhead
39 Air conditioning valve
40 Ejection seat headrest
41 Firing handle
42 Air louvres
43 Ammunition tanks
44 Ammunition link collector box
45 Cartridge case ejectors
46 Batteries
47 Port air inlet
48 Boundary layer splitter plate
49 Inlet lip construction
50 Radio and electronics equipment bay
51 Sliding canopy rail
52 Air conditioning supply pipes
53 Control rod linkages
54 Communications aerial
55 Fuselage double frame bulkhead
56 Boundary layer air outlet
57 Secondary air inlet door spring loaded
58 Inlet duct construction
59 Forward fuselage fuel tank
60 Starboard inlet duct
61 Starboard wing fuel tank
62 230-Imp gal (1046-litre) drop tank
63 Inboard pylon mounting
64 Leading-edge dog tooth
65 100-Imp gal (455-litre) drop tank
66 Outboard pylon mounting
67 Wing fence
68 Leading-edge extension
69 Starboard navigation light
70 Starboard wingtip
71 Whip aerial
72 Fairey hydraulic aileron booster jack
73 Starboard aileron
74 Aileron control rod linkage
75 Flap cut out section for drop tank clearance
76 Starboard flap construction
77 Flap hydraulic jack
78 Flap synchronising jack
79 Starboard main landing gear mounting
80 Retraction jack
81 Starboard landing gear bay
82 Dorsal spine fairing
83 Main wing attachment frames
84 Main spar attachment joint
85 Engine starter fuel tank
86 Air conditioning system
87 Engine inlet compressor face
88 Air conditioning pre-cooler
89 Cooling air outlet louvres
90 Rear spar attachment
91 Aileron control rods
92 Front engine mountings
93 Rolls-Royce Avon 207 engine
94 Bleed air duct
95 Engine bay cooling flush air intake
96 Rear engine mounting
97 Rear fuselage joint ring
98 Joint ring attachment bolts
99 Tailplane control rods
100 Fuel piping from rear tank
101 Rear fuselage fuel tank
102 Fuel collector tank
103 Jetpipe mounting rail
104 Fin root fairing
105 Hydraulic accumulator
106 Tailplane trim jack
107 Fairey hydraulic elevator booster
108 Tailplane mounting pivot
109 Rudder hinge control rods
110 Starboard tailplane
111 Starboard elevator
112 Tailfin construction
113 Fin tip aerial fairing
114 Rudder construction
115 Rudder trim tab
116 Trim tab control jack
117 Tailplane anti-buffet fairing
118 Tail navigation light
119 Brake parachute housing
120 Tailpipe fairing
121 Port elevator construction
122 Tailplane construction
123 Detachable tailcone
124 Tailplane spar mounting frames
125 Jetpipe
126 Jetpipe access doors
127 Rear fuselage frame and stringer construction
128 Airbrake jack housing
129 Airbrake retracted position
130 Airbrake operating jack
131 Airbrake open position
132 Engine bearing cool air outlet
133 Wing root trailing-edge fillet
134 Flap housing construction
135 Port main landing gear bay
136 Main wheel door
137 Port main landing gear retraction jack
138 Main landing gear leg pivot mounting
139 Flap synchronising jack
140 Hydraulic flap jack
141 Port flap
142 Rear spar
143 Aileron control rods
144 Aileron trim tab
145 Port aileron construction
146 Fairey hydraulic aileron booster
147 Wing tip construction
148 Port navigation light
149 Pitot tube
150 3-in (7.62-cm) rocket projectiles
151 Leading-edge extension ribs
152 Wing rib construction
153 Main spar
154 Dowty main landing gear leg
155 Shock absorber torque links
156 Leading-edge dog-tooth
157 Mainwheel doors
158 Dunlop-Maxaret anti-skid wheel brakes
159 Port mainwheel
160 Port wing fuel tank: total internal fuel capacity 392 Imp gal (1782 litres)
161 Leading-edge pin joint
162 ML twin stores carrier
163 9-kg (20-lb) practice bombs
164 Inboard wing pylon
165 1,000-lb (454-kg) bomb
166 Four 30-mm ADEN gun pack
167 Ammunition boxes, 150 rounds per gun
168 Link collector box
169 Gun gas purging air duct
170 Cannon barrels remaining in aircraft when gun pack is withdrawn

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Hawker Hunter 'FGA.Mk 9'
No. 6 Squadron
Sultan of Oman's Air Force
(Al Quwwat al Jawwiya al Saltanat Oman)
Thumrait, Oman, c.1977

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Armament
The Hunter's primary armament consisted of a removeable gun-pack containing four 30-mm cannon, with 150 rounds per gun. For very fast turnarounds, the empty pack could be winched out of the aircraft and replaced by a pre-loaded pack. Although originally designed for air-to-air use (hence the automatic ranging radar in the nose cone) the Hunter gun pack was devastating against ground targets of all descriptions. The Hunter F.Mk 6 and subsequent variants had four underwing hardpoints allowing the carriage of external fuel tanks and/or a range of weapons, though unguided rockets were probably the most popular ground attack weapon. These could be carried on four rails under each of the outer wings, with more on the inboard pylons. In later years, Hunters tended to carry lower-drag rocket pods, like the SNEBs seen on this Omani aircraft. The Hunter was limited to cannon and rocket projectiles because the inboard pylons were too close to the undercarriage to allow the use of twin stores carriers, while the outboard pylons were too far outboard and too far aft to allow bombs to be dropped without an unacceptable pitch change on release.

Starter
The Avon 200 employed a Plessey Isopropyl Nitrate (AVPIN) starter. This removed the aircraft's reliance on cartridge starting, although AVPIN itself is highly unstable, and only a small amount can be carried, sufficient for a couple of start-up attempts. If an aircraft were to land at an airfield without AVPIN, there was every chance that it would not take off again. AVPIN starters also had a tendency to explode, and when they did so would collapse the intakes and cause significant structural damage.

Wing
The F.Mk 6, FGA.Mk 9 and most export variants had the later Mod 228 wing with provision for extra outboard hardpoints. The later wing also introduced an extended outboard leading edge with a distinctive 'dogtooth' discontinuity on the leading edge. This cured any tendency to pitch up. Later versions also featured a flying tailplane, in which the standard power-operated elevator combined with electrically actuated movement of the whole tailplane.

Cockpit
The cockpit of the Hunter was narrow and cramped by comparison with that of the Sabre, and the canopy gave a poorer all-round view. But for many years, the Hunter's uncomfortable Martin Baker ejection seat was the most sought after 'office chair' for fighter pilots. Quite apart from its perfect graceful good looks, the Hunter's beautifully balanced controls inspired affection and confidence in almost equal measure, and the problems of pitch up and of departing (sometimes violently) when using combat flap have often been over-stated. Although the aircraft marked a relatively modest improvement over the arguably better-equipped rival, the North American Sabre, the Hunter's more advanced high-lift wing section and vastly superior engine gave the British aircraft superior acceleration, rate of climb and level speed, as well as superior instantaneous turn performance. Even in the 1980s and 1990s, a lightly loaded Huunter was a useful air combat aircraft. One ex-RAF, KAF, SADC and SOAF Hunter pilot remembered that: "Even in the 1980s, an AIM-9P-armed Hunter stripped of rocket rails and carrying only 100-Imp gal drop tanks could be a nasty proposition at medium level. In Oman we flew DACT against every USAF and USN front-line fighter up to the F/A-18 and we often held our own." The Hunter was an extremely stable gun platform and its four 30-mm cannon packed a powerful punch. The Hunter was robust and rugged, and easy to support in the field, and the aircraft could pull more *g* (7 or 7.5) and sustain much higher levels of battle damage than its rivals, and still limp home to be repaired to fight again.

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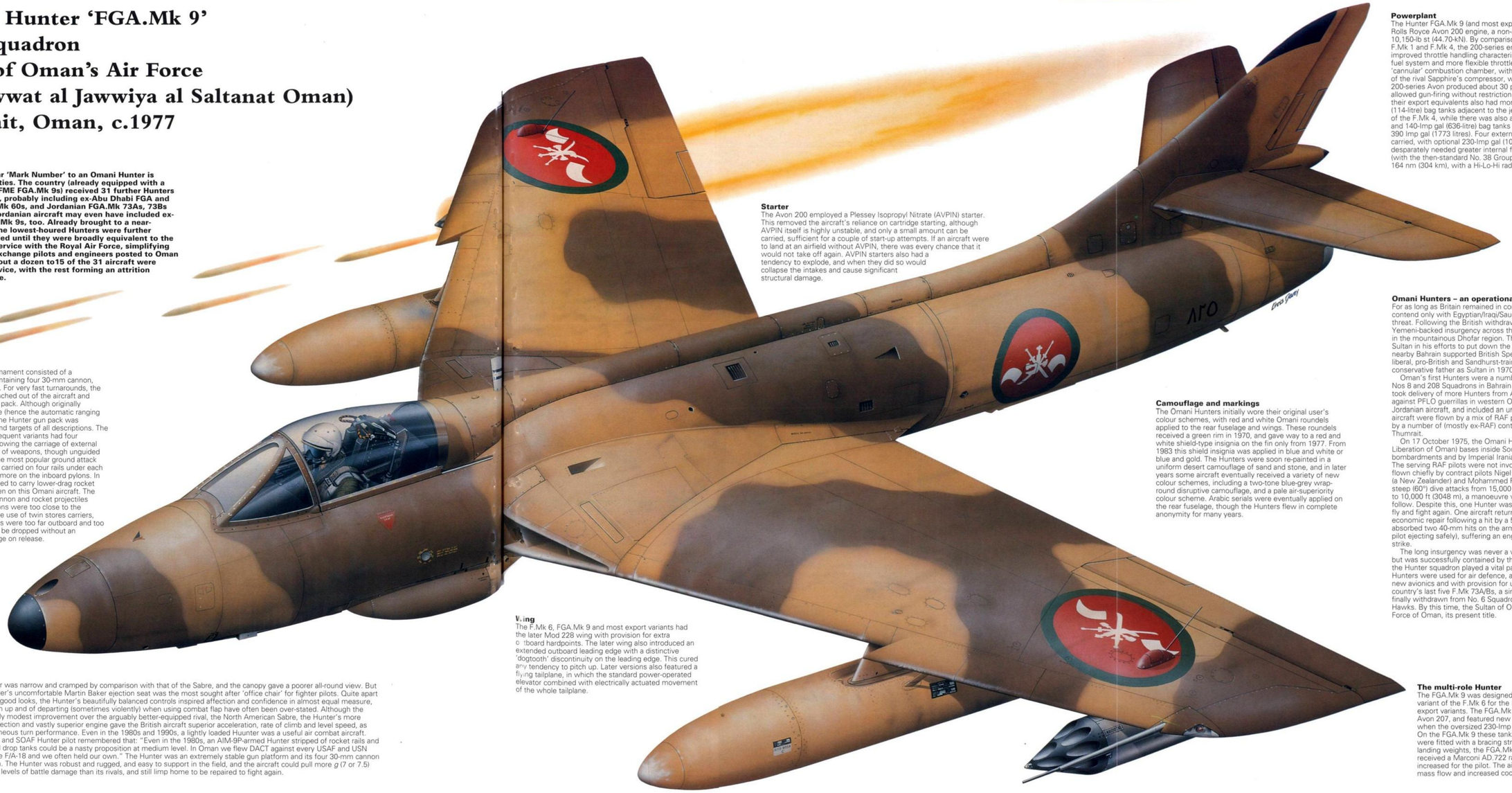

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The Omani Hunters initially wore their original user's colour schemes, with red and white Omani roundels applied to the rear fuselage and wings. These roundels received a green rim in 1970, and gave way to a red and white shield-type insignia on the fin only from 1977. From 1983 this shield insignia was applied in blue and white or blue and gold. The Hunters were soon re-painted in a uniform desert camouflage of sand and stone, and in later years some aircraft eventually received a variety of new colour schemes, including a two-tone blue-grey wrap-round disruptive camouflage, and a pale air-superiority colour scheme. Arabic serials were eventually applied on the rear fuselage, though the Hunters flew in complete anonymity for many years.

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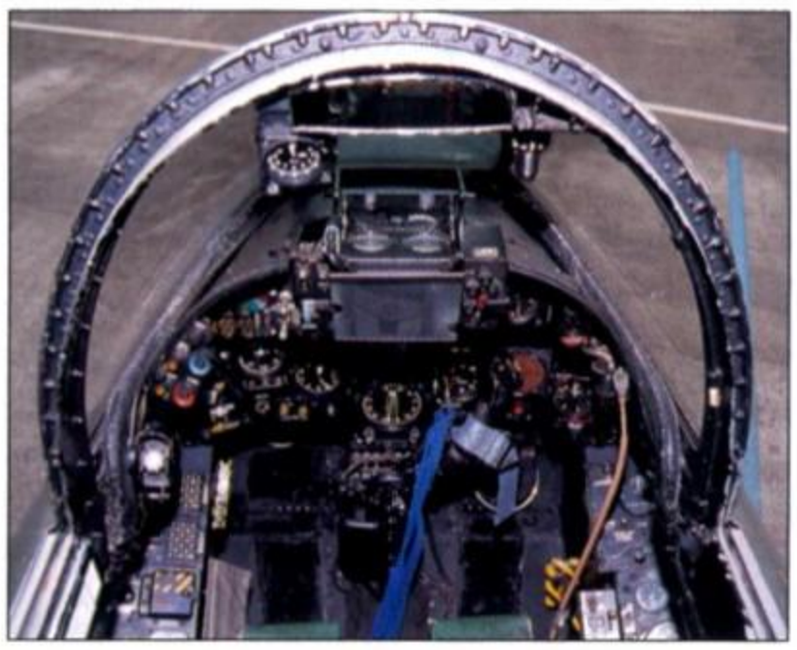
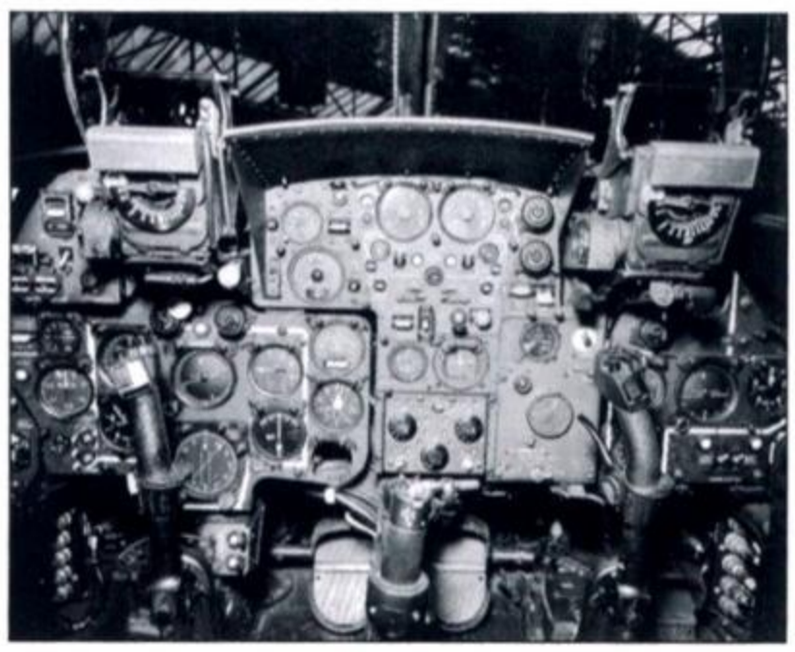
Hunter details

The single-seat Hunter was not well-designed from the pilot's point of view. Note that the control column in this F.Mk 6 obscures the compass; some avionics switches were also difficult to reach.



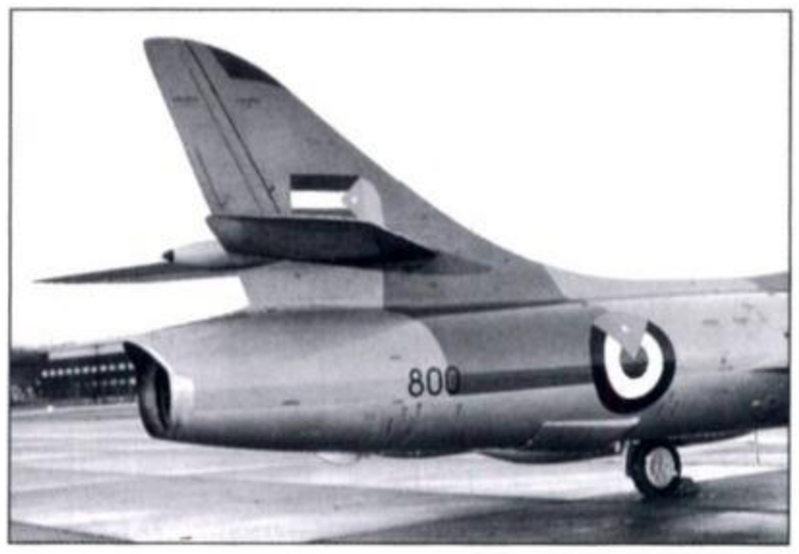
Upgraded Swiss Hunter Mk 58s differed considerably from older aircraft, having been fitted with new equipment, much of it associated with the aircraft's expanded weapons capability.



The two-seat Hunter had the advantage of providing the student and instructor with the exactly the same field of view – something that many other trainer types could not do.

The Hunter's undercarriage was of conventional design with inward-folding main gear (right) and a forward-retracting front nose gear.

Far right: Various gun gas deflector designs were tested in an effort to find a cure to the engine surge problems encountered when the ADEN cannon were fired. The deflectors shown here were the adopted design for single-seaters. Two-seat Hunters with one or two cannon were fitted with a differing design.



Specification

Hunter FGA.Mk 9

Powerplant: one Rolls-Royce Avon RA.28 Mk 207 turbojet rated at 10,150 lb st (45.15 kN)

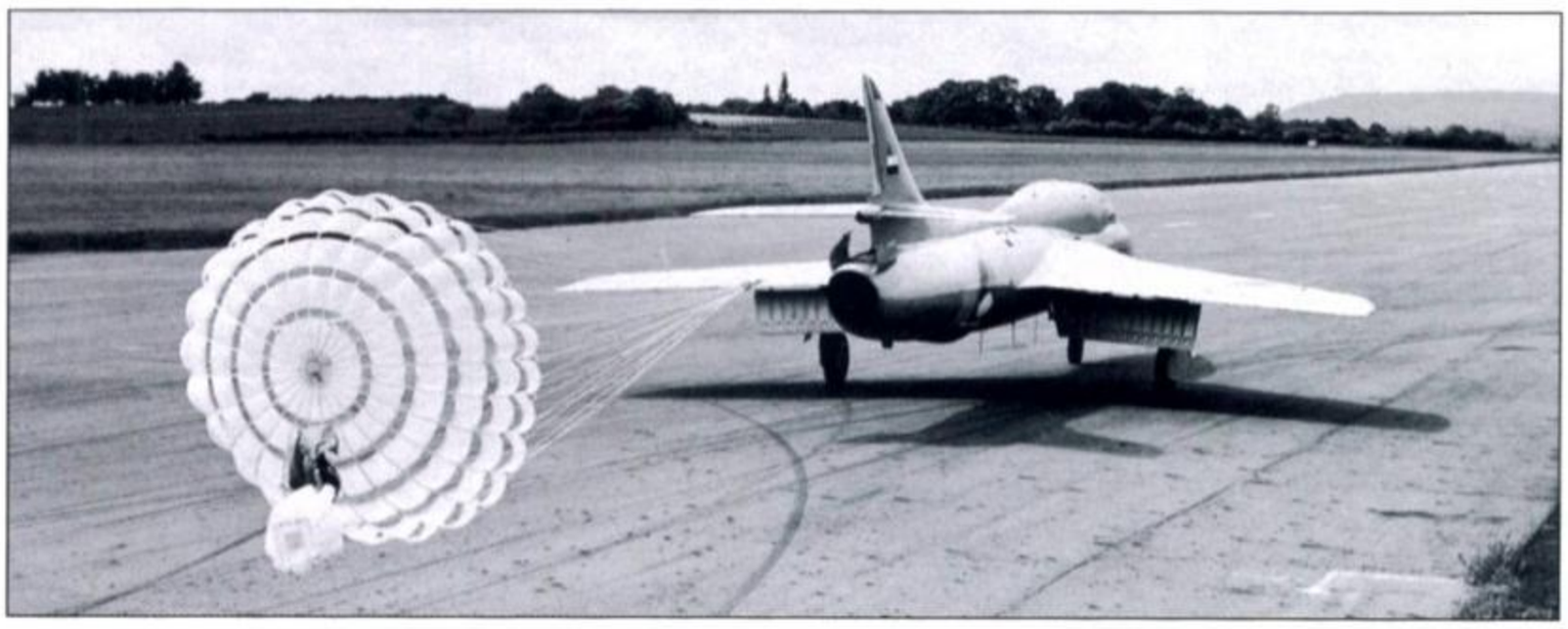
Dimensions: span 33 ft 8 in (10.26 m); aspect ratio 3.25; wing area 349 sq ft (32.42 m²); length 45 ft 10½ in (13.98 m); height 13 ft 2 in (4.01 m); tailplane span: 11 ft 10 in (3.61 m);

Weights: empty equipped 14,400 lb (6532 kg); normal take-off 18,000 lb (8165 kg); maximum take-off 24,600 lb (11158 kg)

Performance: maximum level speed 'clean' at 36,000 ft (10975 m): 538 kt (620 mph; 978 km/h); max. level speed 'clean' at sea level: 616 kt (710 mph; 1144 km/h); maximum cruising speed at 36,000 ft (10975 m): 481 kt (554 mph; 892 km/h); economical cruising speed at optimum altitude: 399 kt (460 mph; 740 km/h); max. rate of climb at sea level: about 8,000 ft (2438 m) per minute; service ceiling: 50,000 ft (15240 m); ferry range with two drop tanks: 1,595 nm (1,840 miles; 2961 km); combat radius: 385 nm (443 miles; 713 km) on hi-lo-hi attack mission with typical warload and two drop tanks; take-off run: 2,100 ft (640 m) at normal take-off weight; take-off distance to 50 ft (15 m): 3,450 ft (1052 m) at normal take-off weight; landing run: 3,150 ft (960 m) at normal landing weight

Armament: four 30-mm ADEN cannon with up to 150 rounds of ammunition per gun. Inboard pylons could carry bombs of up to 1,000 lb (454 kg), 2-in (5.08-cm) multiple rocket batteries, 100-Imp gal (455-litre) napalm bombs, practice bomb carriers and a variety of other stores. Outboard pylons could carry launchers for 24 3-in (7.62-cm) rocket projectiles with various warheads or other types of rocket projectile. Maximum ordnance 7,400 lb (3357 kg)

In 1956, during Hunter Mk 7 development, it was decided that a braking parachute should be fitted to the aircraft. A number of housings were designed and a dummy fitting test flown on Hunter Mk 4 WT780. The final design (above left, seen on a Jordanian Mk 66) was fitted to Mk 7 prototype XJ615 and comprised a top-opening compartment above the tailpipe (above right, removed from a Swiss Mk 58 and below, in a KLu T.Mk 7). The braking 'chute also became a standard feature of the FGA.Mk 9, which was expected to operate from short airstrips in the Middle East and was similarly fitted to export derivatives. A handful of RAF Mk 6 test airframes, RAF FR.Mk 10s and the Fleet Air Arm's T.Mk 8s were also so-equipped.



RAF phase-out

The Hunter had originally been retired by the front-line RAF in 1969, but made a return in 1974 when No. 45 Sqn was formed as a post-TWU 'first tour' posting for prospective Jaguar pilots. The squadron later split to form a second unit, No. 58 Sqn; both were disbanded in 1976. In the training role No. 4 FTS lost its Hunters in the mid-1970s, while No. 79 Sqn (the last Hunter unit in No. 1 TWU) followed suit in 1984. The RAF's last Hunters were those engaged in Buccaneer aircrew training. The Buccaneer OCU (No. 237) disbanded in 1991, its last Hunter T.Mk 7Ds going to No. 208 Sqn for the remaining three years of the 'Bucc's service, which finally ended in 1994. With the retirement of the last DERA test aircraft (F.Mk 6 XE601) in the late 1990s and the loss of ETPS T.Mk 7 XL564 in August 1998, the last military Hunter in UK was T.Mk 7 XL612, seemingly still in use in 2000.

Above: A reconnaissance unit equipped with Canberra PR.Mk 9s at the time of its disbandment in 1970, No. 58 Sqn was reformed on 1 August 1973 by splitting No. 45 Sqn. FGA.Mk 9 XF419/'L' was photographed in 1973.

Right: Reformed at RAF Wittering on 1 August 1972, No. 45 Sqn had flown Canberra B.Mk 15s in the Far East before disbandment in 1970. This pair of Mk 9s carries the squadron's 'winged camel' emblem.

Some students preferred the easy-to-fly Hawk, with its spacious, well laid-out cockpit and simple modern systems, and some instructors preferred the more modern aircraft for its dramatically stepped tandem cockpits which gave a superb view forward from the rear cockpit. Others, however, felt that the Hawk was too easy to fly, and some preferred the Hunter T.Mk 7's side-by-side seating (which allowed them to see exactly what the student pilot was doing). There was a general feeling that the Hawk was a superb flying machine – a gentleman's aircraft – but that the ageing Hunter was a 'real' man's aircraft. Crucially, the Hawk flew weapons training sorties some 50 kt (92 km/h) slower than the Hunter, requiring imaginative ways to increase student workload. "If a student preferred the Hunter, it was an indicator that he was likely to relish a challenge, and would get on better flying real front-line aeroplanes," said one former TWU instructor, somewhat controversially.

No. 79 Squadron was the last of the TWU squadrons to relinquish the Hunter, flying a formation of nine of its last Hunters (including XE597/'F', XE624/'G', XF431/'0', XF435/'52', XG154/'54', XG228/'56', XG254/'57', and T.Mk 7s XL578 and XL595) to St Athan for storage in July 1984. The squadron was responsible for training QWIs, some overseas students and short course students (often refreshing after a ground tour) and for staff conversion. It was less vital that No. 79 operated the Hawk, since few of its students arrived from No. 4 FTS at Valley. At the same time, it was obviously better to have a single aircraft type serving with the TWU, since it allowed easier logistics support and facilitated centralised servicing and greater flexibility. The last Hunters were still in use as late as September 1984, as target tugs, hacks and for chase duties.

FGA.Mk 9 XG252/'U' was retired to Cosford on 25 October 1984. One of the last F.Mk 6As, XE606/'11', was retired to Laarbruch for BDRT use, but ended up being refurbished and put on display by No. 20 Squadron. XF418/'16', an F.Mk 6, was put into store on 20 November 1984, subsequently becoming Wildenrath's gate-guard. FGA.Mk 9s XE597/'F' and XE624/'G' (still in No. 234 Squadron markings) were placed in storage at Brawdy on 29 April 1985, subsequently being put on the main gates at Bentley Priory and Brawdy, respectively. XF511/'A', XF519/'E', XG155/'I', XG207/'T' and XF416/'Z' went to Zimbabwe on 10 April 1984.

Return to the front-line

By the time the TWU had officially formed in 1974, the Hunter FGA.Mk 9 had nominally returned to front-line service with two understrength No. 38 Group squadrons, Nos 45 and 58. These units were established to provide post-TWU training for first-tour ground attack pilots destined for the Jaguar force, and effectively provided a

No. 4 FTS finally lost its Hunters in the mid-1970s as the BAe Hawk was introduced to replace it and the Gnat T.Mk 1s. T.Mk 7 XL600 served with the FTS between 1967 and 1976 before moving to No. 12 Sqn. In 2000 it is privately owned as G-VETA and operated as a display aircraft by the Jet Heritage Museum, Bournemouth.

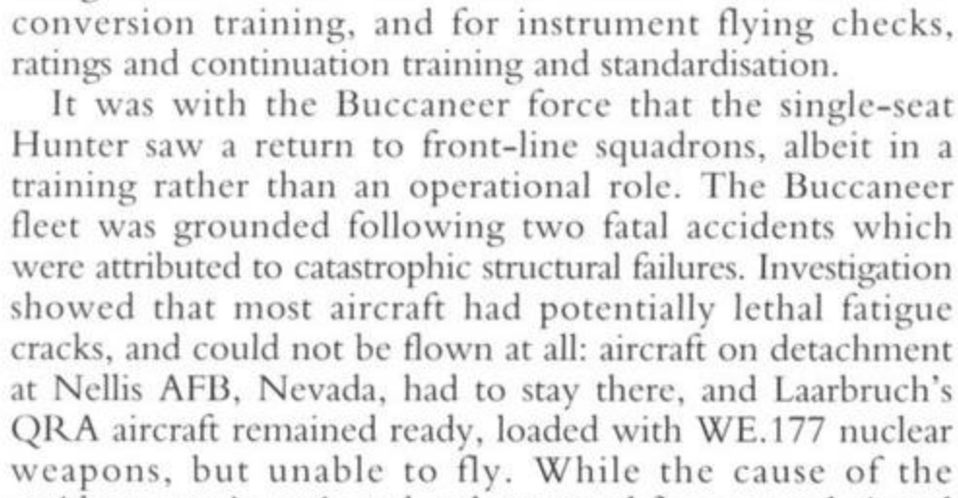
No. 229 OCU was redesignated the Tactical Weapons Unit in 1974, Nos 63, 79 and 234 Sqns maintaining their 'shadow' status within the new organisation. Here the final formation of No. 79 Sqn aircraft is seen en route to RAF St Athan and storage in 1984.

pool of trained and qualified ground attack pilots who were available for operations, or to convert to the new Jaguars as the Jaguar squadrons formed.

It had always been intended that there would be two full squadrons, but this actually never happened. No. 45 Squadron formed first, in 1972, and divided to form a second unit, No. 58 Squadron, the following year. Although commanded by wing commanders and planned to expand to full strength, both squadrons remained at flight strength. The two units operated with centralised servicing and the ground crew split into two 'squadrons' on a shift basis. In recognition of their size, the two 'squadrons' later formed a so-called 'wing'. This was treated like a normal RAF squadron under the command of a single wing commander, with squadron leaders 'in command' of the smaller units, which were effectively flights. They were based at RAF Wittering, where the two units finally disbanded in 1976, their task complete.

The last Hunters in normal RAF service were used for training Buccaneer aircrew. There was never a dual-controlled version of the Buccaneer, and when the type entered RAF service, the Operational Conversion Unit (No. 237 OCU, which formed on 1 March 1971) was equipped with a mix of Hunters and Buccaneers. The Hunters were two-seaters that had been specially modified with the Buccaneer's INS and instrumentation, including the unique ADD, and operated under a host of designations, apparently including the little-known designation T.Mk 7D. These aircraft were used for conversion training, and for instrument flying checks, ratings and continuation training and standardisation.

It was with the Buccaneer force that the single-seat Hunter saw a return to front-line squadrons, albeit in a training rather than an operational role. The Buccaneer fleet was grounded following two fatal accidents which were attributed to catastrophic structural failures. Investigation showed that most aircraft had potentially lethal fatigue cracks, and could not be flown at all: aircraft on detachment at Nellis AFB, Nevada, had to stay there, and Laarbruch's QRA aircraft remained ready, loaded with WE.177 nuclear weapons, but unable to fly. While the cause of the accidents was investigated and structural fixes were designed and embodied, a fleet of 34 Hunters was assembled for use by the pilots of the Buccaneer force to remain in current flying form. Most of these aircraft were twin-stickers, but the total included a number of F.Mk 6s and FGA.Mk 9s.



No. 237 OCU operated Hunter T.Mk 7s equipped with Buccaneer instrumentation. T.Mk 7A XL613/'H' was photographed at RAF Lossiemouth in September 1986.

These Hunters were phased out after six months, when repaired Buccaneers started to be returned to the squadrons. The specially equipped and instrumented two-seat Hunter T.Mk 7s remained in service until the final retirement of the Buccaneer, passing to the last front-line squadrons after the disbandment of No. 237 OCU on 1 October 1991. The last Buccaneer unit, No. 208 Squadron, finally bowed out on 31 March 1994, and still had a number of Hunters on charge.

1994 also brought the replacement of the Royal Navy's last Hunters as the first BAe Hawks arrived in May, prior to the relocation of FRADU from Yeovilton to Culdrose. The Hunters were retired prematurely, since more fuel-efficient Hawks became available unexpectedly as a result of changes to the RAF's fast-jet training system. In retrospect, it can be seen that these aircraft should have been placed in storage, since the RAF was soon to experience a severe shortage of Hawks (which could have been and should have been predicted). The Hawks offered only negligible savings in running costs over the Hunters, and were less popular with the pilots, many of whom were confirmed Hunter aficionados. The Hunters trickled away as the Hawks arrived, being replaced on a one-for-one basis. The last of the Hunters was finally retired in January 1995. The

XG225 was one of the 24 F.Mk 6s brought up to so-called F.Mk 6A standard for use by the TWUs. The yellow markings are believed to denote an instructor's aircraft, used to 'jump' TWU students under training. Identical markings are known to have been applied, though in red, to other TWU aircraft.

Below: XF995, a former T.Mk 8C transferred to No. 237 OCU in 1972 and by now serving with No. 208 Sqn, leads three other aircraft during 1993. The three black Hunters were painted during 1991 to mark the retirement of ACM Sir Patrick Hine, AOCinC Strike Command and a former 'Black Arrows' leader.

With the disbandment of the Buccaneer OCU, the last of the RAF's active Hunters (apart from a handful of ETPS and DERA aircraft) were passed to No. 208 Sqn to serve out their last few months before the 'Bucc's retirement. These modified T.Mk 7s were a mixture of new-build aircraft and a few converted from Mk 4s.

Hunters had also been flown by the pilots of the Royal Navy Reserve's Air Branch, who found themselves transferring to the front-line Sea Harrier while the Hawks took over FRADU's tasks.

Following the withdrawal of the Buccaneer Force and FRADU Hunters, the type was limited to use in ones and twos by test and trials units, including the Empire Test Pilot's School. By 1998, four Hunters remained active. Arguably the most important of these was a T.Mk 7, WV383, named *Hecate, Lady of the Night*. A long-serving R&D, test and trials airframe, WV383 was successively used for HUD, LLTV and FLIR trials work, including the Penetrate FLIR pod, SPRITE IR sensors, GEC's Leoni 'staring FLIR' and SPIRE. The latter produces a skeletal picture of the predicted terrain in the HUD, providing vertical obstruction cues and enhancing the safety of low-level flight. *Hecate* was grounded in late 1998, not because it had outlived its usefulness, but because the aircraft was due for a major overhaul – something which a cash-strapped DERA could not then afford. In the spring of 2000 the aircraft was trucked to Farnborough for static display, ending any chance of it taking to the air again.

ETPS survivor

Until 6 August 1998, the ETPS operated a pair of Hunter T.Mk 7s. They were routinely used for spin-training (the only swept-wing aircraft cleared for deliberate spinning and inverted spinning) and were modified for the role with telemetry and a 'head-up' spin panel with a prominent turn needle, roll direction lights and a 'coarse-calibrated' altimeter, as well as control surface position indicators. A safety pilot on the ground sits in the telemetry station and can offer advice, if required. Unfortunately, one ETPS Hunter was lost on 6 August. Initially it seemed as though the aircraft would be replaced by a Hawk withdrawn from storage, or even by an ex-civil warbird Hunter, and at one time it was suggested that further Hunters could replace the school's two standard Hawks, to allow these to return to normal pilot training duties.

With the retirement of the the TWUs' aircraft, F.Mk 6 XE601 was the RAF's last single-seat Hunter. Though progressively modified to Mk 9 standard, the aircraft appears never to have been officially redesignated as such. Stored by DERA in the late 1990s, it seems unlikely to fly again.

Right: T.Mk 7 XL564 joined the ETPS in 1983. Its crash in 1998 left the test pilot's school with one Hunter Mk 7 – XL612.

FRADU finale

1984 also saw the beginning of the end for the last FRADU Hunters as they were replaced by ex-RAF BAe Hawks, this process being completed early the following year. GA.Mk 11s and T.Mk 8Cs remained in use to the end, along with a pair of ex-RAF T.Mk 7s acquired shortly before the Hunter phase-out.

The final surviving Boscombe Down Hunter was the last 'working' single-seater in Britain. XE601 was used by the Fast Jet Test Squadron as a hack, and was fitted with spray tanks to allow the simulated spraying of NBC agents during Army exercises. Retired from use, the aircraft was reportedly put up for disposal by auction, but was then withdrawn from sale due to the shortage of Hawks in the RAF pilot training world. Reports suggested that XE601 would go to Llanbedr to serve as a chase aircraft for Jindivik drones, replacing a Hawk, though in fact the Llanbedr Hawk and the ETPS Hunters will now be replaced by ex-Luftwaffe Alpha Jets.

Just as the Hunter provided a solution when structural problems grounded the RAF's Buccaneers, the current shortage of Hawk airframes at RAF Valley at one time looked as though it would be alleviated by using Hunters. These aircraft were to have replaced Hawks at Boscombe Down and Llanbedr, allowing the Hawks to return to training duties. Were sufficient Hunters available, it was even felt conceivable that FRADU or No. 100 Squadron would give up its Hawks.

Many people must now be regretting the relatively recent sales of stored ex-RAF and ex-RN Hunters and of taxiable Hunter ground instructional airframes. That these aircraft were potentially airworthy and capable of being returned to operational status can be seen in the fact that most have been snapped up by civilian operators, who now fly them under civil registrations.

Outside the UK, the Hunter lingered even longer in front-line service. In 1984, as Britain retired the last Hunters from the Tactical Weapons Unit, the type remained in large-scale service in Chile, Lebanon, Oman, Singapore, Somalia, Switzerland and Zimbabwe.

In Somalia, the Hunters (transferred from Abu Dhabi in 1983) had a short life before being withdrawn from use and replaced by Soviet- and Chinese-built types. In Singapore, the Hunters had been extensively modernised and modified during their long years in service. Many had gained a unique centreline hardpoint, and most could carry AIM-9P Sidewinders, though the air defence role was relinquished with the arrival of F-5Es from 1979. No. 140 Squadron re-equipped with F-16s in 1990, leaving only No. 141 Squadron at Paya Lebar. The latter unit operated a mix of FGA and FR aircraft, but had a primary tactical reconnaissance tasking. F-5Es were converted to RF-5E configuration from 1990, and by 1992 the unit had entirely re-equipped, and the Hunters stopped flying. Singapore sold its last 21 Hunters – four T.Mk 75Ss, two T.Mk 75s, one F.Mk 74B, seven FGA.Mk 74BSs and seven FR.Mk 74Ss – to an Australian warbird broker in 1995.

In Oman, the Hunter had been similarly upgraded, with new avionics and provision for underwing AIM-9 Sidewinder AAMs. Relying as it did on the RAF for support, training and a relatively large number of exchange tour pilots, Oman could not easily operate the Hunter for very long after the type had been retired in Britain. The country's last five F.Mk 73A/Bs, a single FR.Mk 10 and three T.Mk 66B/67s were finally withdrawn from No. 6 Squadron in November 1993, replaced by BAe Hawks.

Swiss retirement

The next nation to retire its Hunters was Switzerland. The Hunter had formed the backbone of that country's air force for many years, and the type had been repeatedly modernised and modified. The aircraft had been cleared to

Above: An overall coat of glossy Dark Sea Grey became the standard colour scheme for FAA Hunters from 1984. FRADU GA.Mk 11 XE685 '861/VL' fires 2-in rockets at a ground target during weapons practice

Top: In later years much of FRADU's fleet requirements work was carried out in conjunction with the Dassault Falcon 20s operated by FR Aviation, which took over FRADU's operation in 1983. Typically a Hunter would simulate an anti-ship missile fired by an enemy aircraft (simulated by the Falcon) against a Royal Navy surface vessel, allowing the latter to practise its procedures for countering such an attack. Here XE685 formates with Falcon 20 N905FR.

Above left: T.Mk 8C '877/VL' (XF985) was typical of the two-seaters with FRADU during its final years. Sadly this aircraft did not last the distance and was abandoned by its crew after an engine failure in 10 April 1990.

Hunters in the 1990s

Chile, Lebanon, Oman, Singapore, Somalia, Switzerland and Zimbabwe were believed to continue operating Hunters in the mid-1980s, though by 1990 Somalia had probably 'dropped out' of the Hunter 'club'. Singapore, Oman, Switzerland and Chile had all retired their aircraft by 1995, leaving Lebanon as a nominal, if doubtful, operator along with Zimbabwe and India. Though thought to be in use in early 1999, the status of the remaining Zimbabwean aircraft was unclear in 2000. India's target-towing aircraft were still very much active in November 1999.

Below: With Singapore and Switzerland, Oman modified its aircraft locally to carry AIM-9 AAMs. T.Mk 66 804 of No. 6 Sqn, SOAF was photographed in 1988 and carries an AIM-9P on a new inboard pylon.

Above: By mid-February 1995 the last four remaining FACH Hunters (T.Mk 72s 718 and 736; FR.Mk 71As 734 and 735, all upgraded to 'Aguila' standard) had been withdrawn from everyday use and were stored at Los Cerrillos AB, near Santiago, pending disposal. In March they took part in a fly-past to mark the air force's 65th anniversary and were officially grounded the following month.

Above right: Singapore's extensively upgraded Hunters were finally retired in 1992. On this aircraft the centreline hardpoint designed and fitted locally by Lockheed Aircraft Services is seen in use carrying a pair of bombs. Note that the Sidewinder installation employs a new inboard pylon.

Hunter Mk 56A A484, a veteran of almost 35 years service in the IAF, lands at Kalaikunda, West Bengal, in November 1999. Note that A484 has been modified locally with a camera nose.

use a variety of new, more lethal ordnance, from AIM-9 Sidewinders for self-defence to a range of bombs, BL755 CBUs, Oerlikon 8-cm rockets and, from 1986, AGM-65B TV-guided Maverick ASMs. The aircraft also received provision for new 100-Imp gal (455-litre) fuel tanks, new E-Systems radar warning receivers, and enlarged undernose ammunition/link containers housing chaff/flare dispensers. A handful of aircraft were even modified to be able to tow dart or drogue targets, using an underwing MBV-2S winch. The rundown of the Swiss Hunter force began in earnest in May 1994, when Fliegerstaffel 2 disbanded, and the air force retired the last of its non-Maverick-capable aircraft. Some other Hunter squadrons had already been disbanded or converted to other types, but the disappearance of Fliegerstaffel 2 reduced the force to only six squadrons, comprising some 80 aircraft. These units had been disbanded by the end of 1994 (one year earlier than planned) as an economy measure. Perhaps appropriately enough, among the last Swiss Hunters were those of the world famous 'Patrouille Suisse' aerobatic display team, which celebrated its 30th anniversary during 1994, before disbanding.

Today, a handful of Hunters remain nominally operational in the Lebanon, though they fly only occasionally. Four Hunters were retained in airworthy condition in Chile, after the 1995 re-equipment of Grupo 8 with Mirage 5 Elkans, and were used for fighter reconnaissance duties and for reconnaissance training before ex-Belgian Mirage 5BRs (not modified to full Elkan standards) entered service in February. All were finally grounded in April.

India retained the Hunter in the training role into the 1980s with the Hunter OFTU, and with No. 20 Squadron at Kalaikunda, which operated as the 'Thunderbolts' aerobatic team. The Hunter OFTU disbanded some time ago, and No. 20 Squadron had re-equipped with the MiG-27 by late 1996. A Kiran-equipped team took over as the air force display unit but, remarkably, the Hunter continued in service. Spares and all surviving aircraft were concentrated at Kalaikunda, where eight examples still remained airworthy and in regular use in late 1999.

Only in Zimbabwe is the Hunter possibly still in full front-line service. No. 1 Squadron at Thornhill was believed to operate six FGA.Mk 9s and a single T.Mk 81 in 1999, with five more single-seaters in storage. They augment the air force's Hawks (primarily used as advanced trainers, but also as ground attack and reconnaissance aircraft) and Chengdu F-7s (Chinese licence-built MiG-21s) which operate almost exclusively in the air defence role. **Jon Lake**

Civil-owned Hunters and warbirds

Even after the Hunter has finally withdrawn from military service, it seems likely to remain a fairly common sight, since it has become a firm favourite with the world's jet warbird collectors and operators, and remains popular with air show audiences.

The first civil-registered Hunter (apart from Hawker's own demonstrators) was a Dutch T.Mk 7, used by the Nationaal Lucht en Ruientevaartlaboratorium (National Air and Aerospace laboratory, or NLR). Painted in Holland's blue, white and orange national colours, PH-NLH (formerly KLu N-320) was used for a variety of tasks, including sampling, avionics testing, and other research and trials tasks. The first 'private owner' Hunter in the UK was probably G-HUNT, a former Danish F.Mk 51 restored for Spencer Flack, which made its maiden flight on 20 March 1980. The aircraft was subsequently bought by Mike Carlton, for his 'Hunter One' collection. An even earlier civil Hunter was Al Letcher's Mojave, California-based N72602, another ex-RDAF F.Mk 51 which first flew on 23 May 1978 following its restoration. Letcher had previously owned an airworthy Meteor TT.Mk 20.

The civil warbird population has been swelled by periodic sales of ex-RAF and ex-RN airframes from storage or from ground instructional duties, but the biggest boost came when Switzerland withdrew the type, conserving 31 in that country (some of which have subsequently gone abroad) and delivering 42 more to museums and warbird operators in Europe, Jordan, South Africa and the US. Swiss law prohibited the auction of the aircraft (which were still capable enough to be regarded as war material) and to avoid any chance of them finding their way into the wrong hands, the Swiss faced a stark choice – scrap them, or give them to civilian owners. Demand for the aircraft was so high that the planned scrapping programme was cut short, and 73 aircraft were saved from destruction. The Swiss subsequently revealed that donating each of these aircraft to new owners saved their taxpayers the SFr18,000 cost of disassembly and scrapping, a total of SFr1.3 million. Some 50 Hunters now have active civil registrations, though a few are still being restored to flying condition.

As at June 2000, privately-owned Hunters believed to be airworthy (or, at least, recently airworthy) in the United Kingdom included the following:

•Bournemouth Aviation Museum

XL600	T.Mk 7	G-VETA
J-4083	F.Mk 58	G-EGHH

•Classic Jet Aircraft Company, Exeter Airport

WT722	T.Mk 8C	G-BWGN
WT723	PR.Mk 11	G-PRII
owned by Stick and Rudder Aviation Ostend Belgium		
XE665	T.Mk 8C	G-BWGM
XF516	F.Mk 6A	G-BVVC
owned by Peter Hellier		
XL602	T.Mk 8M	G-BWFT
XL613	T.Mk 7A	G-BVMB

•Delta Jets/Delta Engineering Aviation Ltd, Kemble

WV318	T.Mk 7B	G-FFOX
WV372	T.Mk 7	G-BXFI
J-4104	F.Mk 58A	G-PSST
owned by Jonathan Whaley		

•Kennet Aviation, Cranfield

XF515	F Mk.6A	G-KAXF

•Old Flying Machine Company, Duxford

XF357	T.Mk 8C	G-BWGL
J-4090	F.Mk 58	G-SIAL

•The Jet Centre, North Weald

XE685	GA.Mk 11	G-GAII
XE689	GA.Mk 11	G-BWGK

Numerous other aircraft have been preserved in, or restored to, flying condition. In Australia, five aircraft are airworthy, including four ex-Singaporean machines; another ex-RSAF aircraft is based in New Zealand. France has a single ex-Swiss aircraft, while five of these recently retired machines, plus an ex-RAF T.Mk 7, have found their way to Sweden. Switzerland itself has four serviceable aircraft on the civil register, while in the USA 11 examples (five Swiss and six ex-RAF/FAA) are registered to fly. Other notable collections include the Royal Jordanian Historic Flight (comprising an ex-Danish T.Mk 7 and a pair of ex-Swiss F.Mk 58s) and four aircraft based in Cape Town, South Africa.

Above: F.Mk 51 G-HUNT and T.Mk 7 G-BOOM when part of Mike Carlton's Hunter One Collection in the 1980s. G-BOOM later joined the Royal Jordanian Historic Flight.

Above: First US-registered Hunter, F.Mk 51 N72602 (damaged in accident near Chino, Calif, Jan 2000.

Above: ZU-AUJ is ex-RAF F.Mk 6A XE653, owned by Thunder City Entertainment (Mike Beachyhead).

Above: One of the RAF's last Hunters, T.Mk 7B G-FFOX (WV318) is operated by Delta Jets.

Above: N4103Y, an F.Mk 58A owned by D. Lavigna of Wilmington, Dela. (seen in September 1999).

Above: The Royal Jordanian Historic Flight's '712' is ex-Swiss Mk 58 J-4025.

Right: Rarely seen today, a five-Hunter formation flypast was a highlight of the Delta Jets Flying Day at Kemble on 1 May 2000. Included were Delta Jets' two-seaters WV318 (G-FFOX) and WV372 (G-BXFI), Jonathan Whaley's colourful Mk 58A J-4104 (G-PSST), the Exeter-based F.Mk 6A XF516 (G-BVVC) and J-4090, a Mk 58A owned by the Old Flying Machine Company of Duxford.

Left: Among a number of ex-FRADU aircraft sold in airworthy (or close to airworthy) condition was GA.Mk 11 XE689, operated by the Jet Centre out of North Weald aerodrome, Essex.

Hunter Operators

United Kingdom

Royal Air Force

The Hunter was designed to meet a Fighter Command requirement for a day fighter, and several variants served with the Command's units. Hunter F.Mk 1s and F.Mk 2s (and the remaining Meteors) were replaced by F.Mk 4s and F.Mk 5s within home-based Fighter Command squadrons, comprising Nos 1, 34, 41, 43, 54, 56, 66, 92, 111, 222, 245, 247, 257 and 263. From April 1955 F.Mk 4s also served with Nos 3, 4, 14, 20, 26, 67, 71, 93, 98, 112, 118, 130 and 234 Squadrons in RAF Germany, supplanting Sabres and Venoms.

The 1957 Defence White Paper brought a dramatic reduction in Fighter Command strength, and the later F.Mk 6 equipped only four units in RAF Germany (Nos 4, 14, 20 and 26), and Nos 1, 19, 43, 54, 56, 63, 65, 66, 74, 92, 93, 111, 247 and 263 at home.

Although required to be capable of worldwide operation in the original specification, the Hunter saw only limited service outside RAF Germany and the UK (with No. 208, and during deployments by UK-based units) until the advent of the FGA.Mk 9. It was not until the Hunter's latent ground attack capability was exploited that the type was able to replace the ageing Venoms which formed the backbone of NEAF and FEAF ground attack units. The type equipped Nos 8, 43 and 208 Squadrons and No. 1417 Flight in the Middle East, being concentrated at Khormaksar, Aden and then at Muharraq, Bahrain. A single unit (No. 20 Squadron) served in Singapore, with a smaller, flight-strength unit (No. 28 Squadron) in Hong Kong. Britain's withdrawal from east of Suez cut short the FGA.Mk 9's career overseas, and the type was finally phased out of service with the rapid-reaction units of No. 38 Group (Nos 1 and 54 Squadrons) with the arrival of the Hawker Siddeley Harrier. The related FR.Mk 10 served only with Nos II and IV Squadrons in RAF Germany.

Thereafter, the Hunter was limited to second-line and training roles, although it had an even longer and more productive career fulfilling such tasks.

Single-seat RAF Hunters inevitably wore green and dark sea grey disruptive camouflage on their upper surfaces – initially with silver undersides and large red, white and blue D-type roundels and fin-flashes. Fuselage serial numbers, originally in black, became white from about 1959, but reverted to black in the late 1960s. Underwing serials were always black, initially in 36-in (91-cm) characters in a single row on the outer wings, aligned with the spar (reading from the rear to port, and from the front to starboard). Later F.Mk 4s and subsequent aircraft introduced inboard serials in 24-in (61-cm) characters. They were perpendicular to the aircraft centreline and had the two-letter prefix centred above the three numbers, and were broken by the undercarriage doors. Light aircraft grey replaced silver on the undersides from about 1966, and toned-down B-type roundels began to appear in the early 1970s. Shortly afterwards, high-gloss polyurethane paint gave way to matt paint. Some late TWU and Buccaneer force Hunters gained wrap-round camouflage, in which the disruptive camouflage extended to cover the lower surfaces.

Hunter FGA.Mk 9s of No. 229 OCU (No. 79 Sqn) share the flight line at RAF Chivenor with Meteor Mk 7s and 8s in early 1972.

Hunter trainers were originally delivered in high-speed silver finish with yellow 'T-bands' around the wingroots and rear fuselage. The latter gave way to Dayglo – initially painted in large patches on the nose, tail and wingtips, and later replaced by film cut into strips. The silver gave way to light aircraft grey soon afterwards. T.Mk 7s assigned to front-line squadrons sometimes wore standard day fighter camouflage, a practice which had spread to most T.Mk 7s by the end of the 1960s. Thereafter, two-seat Hunters assigned to the tactical training role tended to wear the same camouflage schemes as the single-seaters, although the No. 4 FTS Hunters at Valley (T.Mk 7s and F.Mk 6s) adopted Training Command's striking new red, white and grey livery for their final years in service.

Unit insignia was often applied to the noses of RAF Hunters, sometimes with squadron colours flanking the roundel on the rear fuselage. Squadron markings on two-seaters were often smaller and more restrained, and the descriptions below generally apply to the single-seat operational squadron aircraft. Individual code letters were applied to tailfins and nosewheel doors, sometimes in the squadron's colours, sometimes outlined and sometimes simply in black, white, yellow or red. Coloured spines, fins and wing bands were often applied as exercise markings or (in later years) during conspicuity trials. From 1958, many Hunters gained white wingtips to aid the analysis of combat ciné film.

No. 1 Squadron

No. 1 Squadron traded its Meteor F.Mk 8s for Hunter F.Mk 5s in September 1955, at Tangmere, subsequently deploying to Cyprus for Operation Musketeer. Disbanding on 1 July 1958, the squadron reformed the following day through the renumbering of the Hunter F.Mk 6-equipped former No. 263 Squadron at Stradishall. Plans to transfer two Hunter day fighter squadrons to support out-of-area operations were formulated in 1960. No. 1 Squadron formed the Fighter Command Short Range Strike Wing with No. 54 Squadron, and was thus a natural choice to re-equip with the new ground attack FGA.Mk 9, which began arriving in early 1961. No. 1 Squadron (and No. 54) left Stradishall for Waterbeach in November 1961. In December 1961 Nos 1 and 54 Squadrons left Fighter Command for Transport Command's No. 38 Group. The two Hunter squadrons moved to West Raynham in August 1963. No. 1 Squadron moved to Wittering on 18 July 1969, converting to the Harrier, discarding its Hunters over the next few weeks.

No. 1 Squadron's Hunters carried a simple representation of their winged I badge on the nose, in a red-edged white disc, flanked by red-trimmed white half-diamonds. During Operation Musketeer the squadron's aircraft wore black and yellow 'Suez stripes' around the wingroots and rear fuselage.

No. II(AC) Squadron

No. II(AC) Squadron converted from the Swift FR.Mk 5 to the Hunter FR.Mk 10 at Jever in March 1961. The squadron moved to Gütersloh on 9 September 1961. A new No. 2 (Phantom) Squadron reformed at Brüggen on 1 December 1970, but the existing Hunter unit continued until 31 March 1971, when it disbanded.

The squadron's Hunters wore black bars with a white triangle superimposed on each side of the roundel, with the lower edge level with the centre of the roundel. Individual code letters were carried in black on a white triangle, high on the tailfin.

No. 3 Squadron

No. 3 Squadron at Geilenkirchen converted from the Sabre F.Mk 4 to the Hunter F.Mk 4 during May 1956, but disbanded on 15 June 1957, one of the casualties of the 1957 defence review. The squadron's Hunters wore dark green bars, outlined in yellow, on each side of the roundel, with the lower edge level with the centre of the roundel.

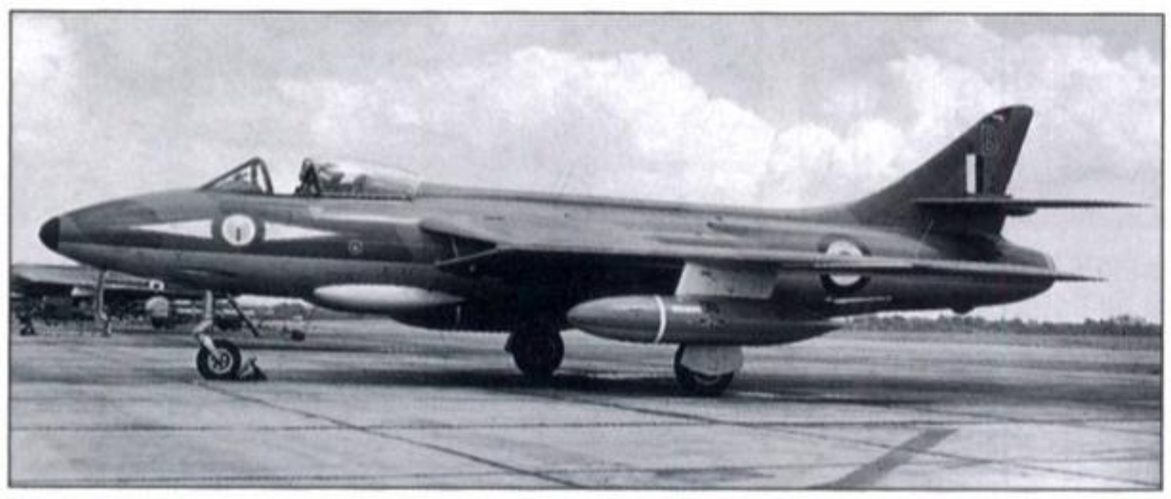
No. IV Squadron

No. IV Squadron converted from the Sabre F.Mk 4 to the Hunter F.Mk 4 in July 1955, at Jever, and Hunter F.Mk 6s arrived in February 1957. The squadron disbanded on 30 December 1960, but No. IV Squadron reappeared as a Hunter unit that same day when No. 79 Squadron at Gütersloh (a Swift FR.Mk 5 unit then re-equipping with Hunter FR.Mk 10s) was renumbered. The squadron moved to Jever on 16 March, returning to Gütersloh on 6 September 1961. The squadron disbanded on 30 May 1970. An echelon of a new No. IV Squadron had already reformed at Wittering in September 1969, and this unit used (largely unmarked) ex-No. 54 Squadron FGA.Mk 9s.

No. IV Squadron's F.Mk 4s wore black and red bars on each side of the roundel, outlined in yellow, with the black (upper) and red divided by a diagonal (downward/inward) yellow lightning flash. The squadron's black and red sun insignia (again divided by a yellow lightning flash, but with the number 4 superimposed) was applied to the nose. The F.Mk 6s had the fuselage bars removed, and miniature versions of them flanked the nose insignia instead. The FR.Mk 10s featured both.

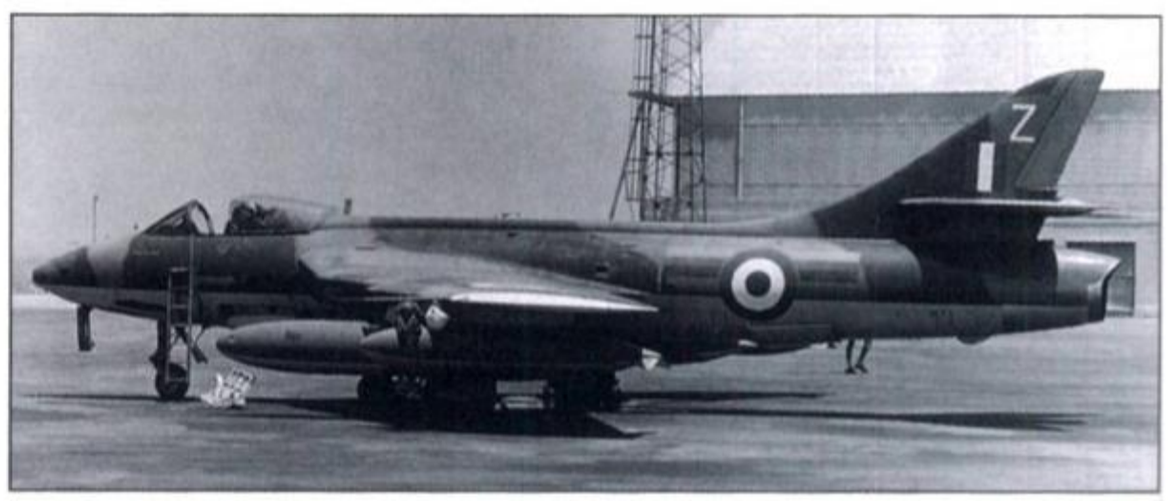
No. 8 Squadron

No. 8 Squadron at Khormaksar, Aden relinquished its Venom FB.Mk 4s for Hunter FGA.Mk 9s in January 1960. The squadron

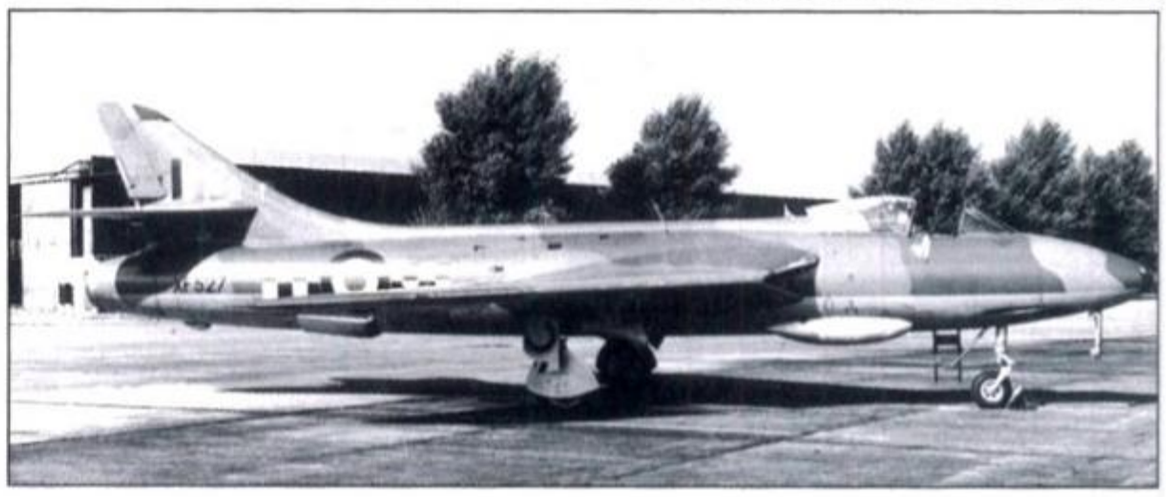


Above: F.Mk 5 of No. 1 Sqn.

Below: F.Mk 4 of No. 112 Sqn.



Above: FR.Mk 10 of No. 8 Sqn.



Below: F.Mk 6 of No. 19 Sqn at Jever.

No. 43 Sqn crew trade their Hunter FGA.Mk 9s for the locally-supplied transport employed by Khormaksar's station security personnel.

Above: FGA.Mk 9 of No. 208 Sqn at a MEAF station during the 1960s.

Right: The third RAF unit to receive Hunter F.Mk 1s, No. 54 Sqn lost no time in forming a display team to represent No. 11 Group, Fighter Command. Here its four aircraft are seen completing a loop during practice. Just discernible is the yellow lightning bolt on the leader's aircraft, coded 'Q', and the blue lightning bolt on the grey tail of the aircraft in the slot position.

gained a flight of FR.Mk 10s in April 1961, but it split to form No. 1417 Flight in March 1963. The squadron moved to Muharraq, Bahrain in September 1967, where it reabsorbed the FR.Mk 10s of No. 1417 Flight, before disbanding on 21 December 1967.

The squadron's Hunters wore 'fish-tailed' sand, blue and red bars on each side of the roundel, with the upper edge level with the top of the roundel. When Nos 8 and 43 Squadrons formed the Khormaksar Tactical Wing (between 1963 and 1967) the aircraft wore No. 8 Squadron's bars forward of the roundel, and No. 43's aft.

No. 12(B) Squadron

No. 12 Squadron used a succession of two-seat Hunters for training and standardisation during its time as a Buccaneer maritime strike unit (from October 1969 until 1 October 1993, moving from Honington to Lossiemouth in August 1980). In 1980 and 1981, while the Buccaneer force was grounded, the squadron conducted limited training using only an expanded pool of Hunters, including single-seaters borrowed from the TWUs.

No. 12 Squadron's Hunters carried the unit's fox's mask badge on their noses, and the permanent T.Mk 7s eventually gained two-letter tailcodes, including 'ZF'.

No. 14 Squadron

The Fassberg-based No. 14 Squadron moved to Oldenburg in June 1955 to re-equip with Hunter F.Mk 4s, re-equipping with F.Mk 6s in April 1957. The unit survived the disbandments which followed the 1957 defence review, moving to Ahlhorn in September, then to Gütersloh in September 1958. It remained at Gütersloh (apart from a seven-month break at Jever, from March 1961) until disbanded on 17 December 1962.

No. XV Squadron

As a front-line Buccaneer strike/attack squadron, No. XV at Laarbruch operated a handful of Hunter T.Mk 7 hacks. Between 1980 and 1981 (while the Buccaneers were grounded following two catastrophic structural failures) the squadron's Hunter complement was swelled. The Hunters wore a white 'XV' on their noses. No. XV Squadron was absorbed by No. 16 in July 1983, and re-equipped with Tornados in September 1983.

No. 16 Squadron

No. 16 Squadron was a Buccaneer unit co-located beside No. XV Squadron, and operated Hunters on much the same basis. Its aircraft wore the unit's unofficial 'running saint' matchstick man badge on their tailfins, in gold, on a gold-rimmed black disc. The squadron retained a handful of Hunters until it disbanded on 29 February 1984, a new No. 16 standing up with Tornados the next day.

No. 19 Squadron

Hunter F.Mk 6s replaced Meteor F.Mk 8s with Church Fenton-based No. 19 Squadron in October 1956. They served until February 1963, following a move to Leconfield on 29 June 1959, where conversion to the Lightning began in December 1962. The Hunter T.Mk 7s lingered well into the Lightning era. The Hunters wore blue and white checks on each side of the roundel, centred with the roundel itself.

No. 20 Squadron

No. 20 was one of several squadrons with which the Hunter had two lives. The first began in November 1955, when the Oldenburg-based Sabre unit received Hunter F.Mk 4s. They gave way to F.Mk 6s in May 1957, with which the unit moved first to Ahlhorn in September 1957, and then Gütersloh in August 1958, before the squadron disbanded on 30 December 1960. The F.Mk 4s and F.Mk 6s wore medium blue bars on each side of the roundel, broken by a thin red, white and green horizontal stripe.

A new No. 20 Squadron reformed at Tengah, Singapore in September 1961, flying FGA.Mk 9s. The squadron added a flight of Scottish Aviation Pioneers for FAC duties in January 1969, and disbanded on 18 February 1970, having operated detachments at Chieng Mai, Kuching and Labuan. The FGA.Mk 9s carried the squadron's sword-carrying eagle and setting sun badge on the nose, in a white disc, flanked by pale blue bands, broken by a thin red, white and green horizontal stripe. Nosewheel doors were red, and bore the legend 'XX' as well as the individual aircraft letter.

No. 26 Squadron

No. 26 Squadron's first incarnation as a Hunter unit began in June 1955, when the Sabre-equipped unit converted to Hunter F.Mk 4s at Oldenburg. The squadron disbanded on 10 September 1957, only to reform at Ahlhorn on 7 June 1958 with Hunter F.Mk 6s. It moved to Gütersloh in September 1958 and disbanded on 30 December 1960. The aircraft carried the squadron's springbok's head badge on a white disc on the nose, flanked by green-edged (yellow-edged on the F.Mk 6) black rectangles with diagonal (upwards/outwards) green lightning flashes.

No. 28 Squadron

No. 28 Squadron was a flight-strength unit based at Kai Tak, Hong Kong and was charged with showing an RAF presence in the colony. It traded Venom FB.Mk 4s for Hunter FGA.Mk 9s in May 1962, and kept them until it disbanded in January 1967. The aircraft wore the unit's half Pegasus badge on their noses, flanked by yellow-edged blue bars.

No. 34 Squadron

No. 34 Squadron partnered No. 1 Squadron within the Tangmere wing, replacing its Meteor F.Mk 8s with Hunter F.Mk 5s in October 1955. After deploying to Cyprus and participating in Operation Musketeer, the squadron disbanded on 15 January 1958, handing its aircraft to No. 208 Squadron. The squadron had the largest unit markings applied to any Fighter Command Hunters, with the wolf and crescent moon badge flanked by a huge, red-edged black-and-yellow checked nose chevron.

No. 41(F) Squadron

No. 41 Squadron at Biggin Hill traded Meteor F.Mk 8s for Hunter F.Mk 5s in June 1955, and then disbanded on 31 January 1958, the last front-line fighter squadron based at the historic Battle of Britain station. The squadron's Hunters wore the unit's cross of Lorraine badge on their noses, flanked by white/red/white horizontal bars.

No. 43 Squadron

No. 43 Squadron at Leuchars introduced the Hunter F.Mk 1 into service in July 1954, re-equipping with F.Mk 4s in February 1956, and gaining F.Mk 6s from November 1956; the latter initially served only until December, before being reintroduced in January 1958. The squadron formed a four-aircraft aerobatic team, 'The Fighting Cocks', with its initial F.Mk 1s, and the team continued with F.Mk 4s. The Hunter FGA.Mk 9 arrived in May 1960, and the unit moved, first to Nicosia (Cyprus) in June 1961, then to Khormaksar (Aden) in March 1963. Here the squadron partnered No. 8 within the Khormaksar Tactical Wing, but disbanded on 7 November 1967.

No. 43 Squadron's F.Mk 1s had black-and-white checkerboards flanking their fuselage roundels, and soon gained a cartoon fighting cock on the port side of their noses. The checkerboards were raised to be level with the top of the roundel on the last F.Mk 1s and the F.Mk 4s, lifting the markings clear of the dirtier lower fuselage. The F.Mk 6s added black-and-white checked wingtips. The FGA.Mk 9s lost the rear fuselage checks, applying them smaller on the nose, flanking the cartoon fighting cock. Within the Khormaksar wing, the FGA.Mk 9s lost their nose markings and had the original high checkerboard aft of the roundel, with No. 8 Squadron's bars forward.

No. 45 Squadron

No. 45 Squadron reformed at West Raynham on 1 August 1972 as a flight-strength advanced training unit equipped with Hunter FGA.Mk 9s. It moved to Wittering on 29 September 1972, where it remained a squadron in name, though it became a subservient part of the Wittering Hunter Wing, which itself functioned as a squadron. No. 45 disbanded on 26 July 1976.

No. 45 Squadron's Hunters wore the unit's winged camel badge on a white disc on the nose, flanked by red diamonds on a blue bar, thinly outlined in white.

No. 54(F) Squadron

No. 54 Squadron traded Meteor F.Mk 8s for Hunter F.Mk 1s at Odiham in February 1955, then re-equipped with F.Mk 4s in September 1955 and F.Mk 6s in January 1957. The unit formed the first Hunter F.Mk 4-equipped aerobatic team with four F.Mk 4s in 1956, known as the 'Black Knights', for which its pilots wore black flying suits. The unit moved to Stradishall where it joined No. 1 Squadron, and where it re-equipped with FGA.Mk 9s in March 1960. The squadron moved to Waterbeach on 23 November 1961, and to West Raynham on 14 August 1963. No. 54 relinquished its Hunters and moved to Coningsby on 1 September 1969.

The squadron's Hunters wore blue and yellow checks on their noses, flanking the unit's traditional blue lion rampant badge. Aerobatic team aircraft were similarly marked, although the lead aircraft had a blue fin with a bold yellow lightning flash, and the 'box' aircraft had a yellow fin with blue lightning flash. The F.Mk 4s wore the same markings as the F.Mk 1s, but the F.Mk 6 introduced a white disc on which the lion badge was applied.

No. 56 Squadron

No. 56 Squadron had been the RAF's first British squadron to be equipped with swept-wing fighters, the ill-fated Swift, in 1954. Unfortunately, the Swift's problems were too severe to be solved, and the Waterbeach-based unit found itself reverting to Meteor F.Mk 8s before finally

converting to Hunter F.Mk 5s in June 1955. F.Mk 6s followed in November 1958, and in July 1959 the squadron moved to Wattisham, where it began conversion to the Lightning from December 1960. The squadron's F.Mk 6s had gone by January, but the T.Mk 7 was retained after conversion to the Lightning, since no two-seat Lightnings were available for some time.

No. 56 Squadron applied its red-and-white checkerboard marking (thinly outlined in pale blue) to the noses of its Hunters, flanking the traditional firebird badge which was itself displayed on a pale blue disc. The aircraft also had red-and-white checked wingtips.

No. 58 Squadron

No. 58 Squadron reformed at Wittering on 1 August 1973 from a nucleus provided by No. 45 Squadron. It was a flight-strength advanced training unit equipped with Hunter FGA.Mk 9s. It never reached full squadron strength, and became a subservient part of the Wittering Hunter Wing, which itself functioned as a squadron. No. 58 disbanded on 4 June 1976.

No. 58 Squadron's Hunters wore the unit's owl badge on a white disc on the nose, flanked by green diamonds on a blue bar, thinly outlined in white.

WV383* Hecate *joined the RAE in the 1970s and remained in use until the 1990s.

Hunter F.Mk 6 XG204 '70', seen in May 1968, is an early No. 4 FTS aircraft.

This attractive Signal Red/White/Light Aircraft Grey scheme was applied to No. 4 FTS aircraft from 1970.

Part of the CFE, the Fighter Combat School operated this unidentified Mk 6.

No. 63 Squadron

No. 63 Squadron at Waterbeach flew Hunter F.Mk 6s between November 1956 and 30 October 1958, when it disbanded. No. 63 Squadron's identity was revived on 1 June 1963, when No. 145 was renumbered. The shadow identity was retained by the TWU, and No. 63 Squadron graduated its last Hunter course in May 1979, subsequently converting to the BAe Hawk.

As a front-line fighter unit, No. 63 applied black-and-yellow checkerboards flanking the roundels of its Hunters, these being aligned with the top of the roundel. The CO's aircraft had its fin and tailplanes covered in swept checks, although the rudder and elevators were left in standard camouflage paint. As a No. 229 OCU and TWU shadow squadron, No. 63's aircraft had smaller checkerboards on the nose, flanking its axe-wielding forearm badge in black on a yellow disc.

No. 65 Squadron

No. 65 Squadron at Duxford received Hunter F.Mk 6s in November 1956 and served until disbandment on 31 March 1961. Its aircraft wore the traditional lion-and-swords badge on their noses, flanked by white bars with outward-pointing red chevrons.

No. 66 Squadron

No. 66 Squadron traded Sabres for Hunter F.Mk 4s at Linton on Ouse in March 1956, receiving F.Mk 6s in October, and moving to Acklington on 14 February 1957. The squadron disbanded on 30 September 1960.

The F.Mk 4s and early F.Mk 6s wore the squadron's rattlesnake badge high on the nose, below the windscreen, flanked by tiny blue-edged white bars. Later F.Mk 6s had the full squadron crest on the nose (without bars) and the rattlesnake in a white disc on the fin. Their roundels divided a rearward-pointing white arrowhead, outlined thickly in dark blue.

No. 67 Squadron

No. 67 at Brüggen traded its Sabres for Hunter F.Mk 4s in January 1956, but disbanded on 31 May 1957, an early casualty of the 1957 White Paper. Markings were seldom applied on No. 67 Squadron's Hunters but, when present, they comprised a tiny representation of the full crest flanked with yellow-outlined half diamonds on a blue bar.

No. 71 Squadron

No. 71 Squadron followed much the same pattern as No. 67, receiving F.Mk 4s in April 1956 at Brüggen, but disbanding on 31 May 1957. Its aircraft wore white and yellow horizontal bars on the nose, on which were superimposed black diamonds. They flanked a white disc on which the unit's eagle insignia was displayed.

No. 74 Squadron

No. 74 at Horsham St Faith traded Meteor F.Mk 8s for Hunter F.Mk 4s in March 1957, stepping up to F.Mk 6s in November. The squadron moved to Coltishall in June 1959, and began re-equipping with Lightnings in June 1960. The last single-seat Hunters were phased out in November that year.

No. 74 Squadron applied its tiger's head badge to the noses of its Hunters, flanking this with segmented black-and-yellow bars. Some F.Mk 6s carried a facsimile of the signature of the squadron's most famous leader, 'Sailor Malan'.

No. 79 Squadron

No. 79 Squadron was in the process of converting from the Swift FR.Mk 5 to the Hunter FR.Mk 10 when it renumbered as No. IV Squadron. There is some doubt whether any Hunters had actually arrived by that date. No. 79 Squadron's identity was revived in January 1967 when No. 229 OCU gained an expanded Weapons' Instructor Flight. As a shadow squadron, No. 79 served through the transition from No. 229 OCU to the TWU and the move to RAF Brawdy. It was the last of the TWU shadow units to replace its Hunters with Hawks, in 1984.

The squadron's aircraft (F.Mk 6s, F.Mk 6As, T.Mk 7s, FGA.Mk 9s and FR.Mk 10s) wore white bars flanking the fuselage roundel, on each of which was superimposed a red arrow.

No. 92 (East India) Sqn

Linton on Ouse-based No. 92 Squadron swapped Sabres for Hunter F.Mk 4s in April 1956, and moved to Middleton St George on 1 March 1957. There, it immediately received F.Mk 6s, and then moved first to Thornaby (in September 1957), back to Middleton St George (October 1958), and finally to Leconfield (22 May 1961). The squadron began to re-equip with Lightnings in April 1963, and the last F.Mk 6s left that same month.

The unit's Hunters were initially marked sedately – with small blue and yellow checks flanking a small representation of the squadron crest below the windscreen on both sides. The F.Mk 6s replaced the full crest with a larger representation of the cobra and maple leaf badge, and many aircraft also added a double row of checks across two-thirds of the fin-root, from the trailing edge forwards. No. 92 Squadron assumed the Fighter Command aerobatic team commitment from the 'Black Arrows' of No. 111 Squadron for the 1961-1962 season, for which its aircraft were painted a rich royal blue overall, with a thin white cheat line culminating in a Lightning flash on the nose. Wingtips were white, and the roundels were thinly picked out in white, as was the raked fin flash.

No. 93 Squadron

The Jever-based No. 93 Squadron traded its Sabres for Hunter F.Mk 4s in January 1956, re-equipping with F.Mk 6s in March 1957 and disbanding on 30 December 1960.

The F.Mk 4s carried a yellow escarbuncle on a blue disc on the nose, with yellow arrows on blue bars thinly outlined in yellow flanking the fuselage roundel. On the F.Mk 6, smaller arrows and bars flanked the nose badge, and the rear fuselage was left clear.

No. 98 Squadron

The Venom-equipped No. 98 Squadron moved from Fassberg to Jever on 19 April 1955, where it re-equipped with Hunter F.Mk 4s. It disbanded on 25 July 1957.

Its aircraft carried red bars on each side of the roundel, with white zigzags superimposed. Tiny facsimiles of these bars were also carried on the nose, flanking a minuscule representation of the squadron badge.

No. 111 Squadron

'Treble One' traded its tired Meteor F.Mk 8s for Hunter F.Mk 4s at North Weald in June 1955. Re-equipping with F.Mk 6s in November 1956, the unit moved to North Luffenham in February 1958, then to Wattisham in June. Hunters remained in use until August 1961, although conversion to the Lightning began in April 1961.

The squadron's first Hunters carried yellow-edged black bars on each side of the fuselage roundel and a small representation of the squadron crest below the port windscreen. In 1956 the squadron formed a four-aircraft team, the 'Black Arrows', but its aircraft were not specially marked. The team continued when the squadron re-equipped with the F.Mk 6, but soon expanded. As the Fighter Command aerobatic team from 1957, No. 111 Squadron fitted crude smoke generators to the aircraft. It painted nine (and eventually 14) of its Hunters in gloss black overall with red serials, and later with white edges to the roundels and raked fin flash. The bars flanking the roundels were removed. At Farnborough in 1958, these 14 aircraft (with eight more from Nos 1, II, 19, 56 and 92 Squadrons, and from the CFE and No. 229 OCU) performed a historic 22-aircraft formation loop.

In 1959 the squadron received the Britannia Challenge Trophy in recognition of its performance.

No. 112 Squadron

When the Brüggen-based No. 112 Squadron re-equipped with Hunter F.Mk 4s in April 1956, its aircraft were immediately decorated with the unit's historic shark-mouth marking. Individual code letters were painted on the fuselage, behind the roundel. The squadron disbanded on 31 May 1957.

No. 118 Squadron

No. 118 Squadron traded Venoms for Hunter F.Mk 4s at Jever in May 1955, but disbanded on 22 August 1957. Its aircraft carried the unit's wavy black-and-white stripes on each side of the roundel, and in miniature form below the cockpit, flanking the squadron badge.

No. 127 Squadron

No. 127 Squadron was a shadow unit within No. 229 OCU at Chivenor, forming in November 1957 and renumbering as No. 234 Squadron in November 1958. No unit markings were worn, apart from the tailcode 'ES'.

No. 130 (Punjab) Sqn

No. 130 Squadron at Brüggen only just exceeded one year as a Hunter operator, trading in its Sabres in April 1956 and disbanding on 31 May 1957. The unit's F.Mk 4s carried the traditional elephant's head badge on the nose, flanked by white-edged red half-diamonds on a white-edged blue bar.

No. 131 Squadron

No. 131 Squadron was a shadow unit within No. 229 OCU at Chivenor, forming in October 1958 and renumbering as No. 145 Squadron in November 1958. No unit markings were worn, apart from the tailcode 'RS'.

No. 145 Squadron

No. 145 Squadron's identity was used as a shadow by one of No. 229 OCU's squadrons (formerly No. 127 Squadron) from November 1957 until 1 June 1963, when No. 226 OCU took over the identity for its Lightnings.

The unit's Hunter F.Mk 4s, F.Mk 6s and T.Mk 7s wore white rectangles flanking the roundel, on which were superimposed St George's crosses. They were replaced on later F.Mk 6s by white pennants on the nose, flanking the number 145 in red on a yellow scroll.

No. 208 Squadron

No. 208 had three periods as a Hunter squadron. The first began in January 1958, when a detachment took over No. 34 Squadron's F.Mk 5s at Tangmere, before re-equipping with F.Mk 6s which it flew to Amman, Jordan in March 1958, when the unit officially re-equipped. The squadron disbanded on 31 March 1959. No. 208 Squadron re-equipped with Hunter FGA.Mk 9s at Stradishall in March 1960, having previously operated Venoms from Eastleigh Airport, Kenya (where No. 142 Squadron had been renumbered). No. 208 flew its new FGA.Mk 9s to Eastleigh in June 1960, and one year later flew to Bahrain. The squadron then moved around the Persian Gulf, spending over two years (from December 1961 to June 1964) at Khormaksar before settling at Muharraq, where it disbanded in September 1971. Long after it relinquished its front-line Hunter FGA.Mk 9s, No. 208 Squadron continued its association with the type, operating a handful of T.Mk 7s alongside its operational Buccaneers, first from RAF Honington and then (from July 1983) from Lossiemouth. The unit even regained some single-seaters during the mass grounding of Buccaneers in 1980-81. The squadron finally stood down on 31 March 1994.

No. 208's F.Mk 5s and F.Mk 6s wore pale blue bars on each side of the fuselage roundel, centred with the roundel and divided by a horizontal yellow stripe. The FGA.Mk 9s initially had a pale blue-and-yellow chevron on the nose, 'pointing' to the unit's traditional Sphinx badge. This marking gave way to the original blue-and-yellow bars, although they were shifted up to be level with the top of the roundel, and were thinly edged in black. The Buccaneer-era Hunters wore pale blue-and-yellow chevrons on their noses, with the squadron's unofficial flying eye badge on their tailfins. Three of No. 208 Squadron's Hunter T.Mk 7s were repainted black overall for a flypast marking the retirement of a senior officer who had once flown with No. 111 Squadron's 'Black Arrows' aerobatic team.

No. 216 Squadron

No. 216 Squadron operated Hunters alongside its Buccaneers from its formation at Honington in July 1979 and after its move to Lossiemouth on 4 July 1980. It was still in the process of becoming operational with the Buccaneer when the type was grounded. The squadron briefly continued training using an expanded fleet of Hunters, but was absorbed by No. 12 Squadron in August 1980.

The unit's Hunters wore the squadron's bomb-carrying eagle badge on their noses.

No. 222 (Natal) Sqn

No. 222 Squadron operated F.Mk 1s and F.Mk 4s alongside those of No. 43 Squadron at Leuchars, and applied similar checkerboard markings (in red and blue) flanking the fuselage roundel, shifting them upwards on the F.Mk 4s. The squadron received its F.Mk 1s in December 1954, and F.Mk 4s in August 1956. It disbanded on 1 November 1957.

No. 234 Squadron

No. 234 Squadron at Geilenkirchen replaced its Sabres with Hunter F.Mk 4s in May 1956, only to disband on 15 July 1957. It was resurrected late in 1958 as as Shadow within No. 229 OCU, transferring to the TWU at Brawdy in 1974 and continuing to fly Hunters until 1980.

The squadron's first Hunters wore the traditional dragon badge flanked by black bars on which were superimposed two horizontal rows of red diamonds. As the squadron became part of No. 229 OCU, the dragon was applied on a white disc.

No. 245 Squadron

No. 245 Squadron at Stradishall was probably the shortest-lived Hunter unit, replacing Meteor F.Mk 8s with Hunter F.Mk 4s in April 1957, only to disband in June. The aircraft wore a small, single eight-square checkerboard on the nose in yellow and blue.

No. 247 (China British) Sqn

No. 247 Squadron at Odiham replaced Meteor F.Mk 8s with Hunter F.Mk 4s in May 1955, gaining F.Mk 6s in March 1957. The squadron disbanded in December 1957. The aircraft wore a plain red bar (thinly outlined in black) on each side of the roundel.

No. 257 (Burma) Sqn

Wattisham-based No. 257 Squadron traded its Meteors for Hunter F.Mk 2s in September 1954, moving to Wymeswold in June 1956, and to Wattisham in January 1957. It disbanded on 31 March 1957.

The squadron's aircraft initially wore blue and yellow checks flanking the fuselage roundel, but they were moved to the nose where they flanked a large representation of the squadron's Chinthe badge.

No. 263 Squadron

No. 263 Squadron at Wattisham received Hunter F.Mk 2s in February 1955, augmenting them with F.Mk 5s from May. The squadron moved to Wymeswold in June 1956, where it re-equipped with F.Mk 6s in August. No. 263 returned to Wattisham in January 1957, before moving on 30 August 1957 to Stradishall, where it disbanded on 2 July 1958.

Squadron markings consisted of a red lion holding a blue cross on the nose, flanked by red bars with blue crosses superimposed. On the F.Mk 6, the bars were of increased depth, and were thinly outlined in yellow.

No. 1417 Flight

No. 1417 Flight formed from No. 8 Squadron's reconnaissance element on 1 March 1963, with four Hunter FR.Mk 10s, also taking over the Station Flight's four T.Mk 7s. It was reabsorbed by No. 8 Squadron on 8 June 1967.

The flight's aircraft wore the Khormaksar station crest on their noses, at the point of a black/blue/yellow/green/black arrowhead chevron, outlined in white. The aircraft carried the pilot's initials as fin codes.

A former F.Mk 4, T.Mk 7 WV253 was one of the first Hunters to join the ETPS.

Production T.Mk 7 XL612 remained in use by the ETPS in 2000.

XL591 was an RAF Lossiemouth-based T.Mk 7 of No. 237 OCU.

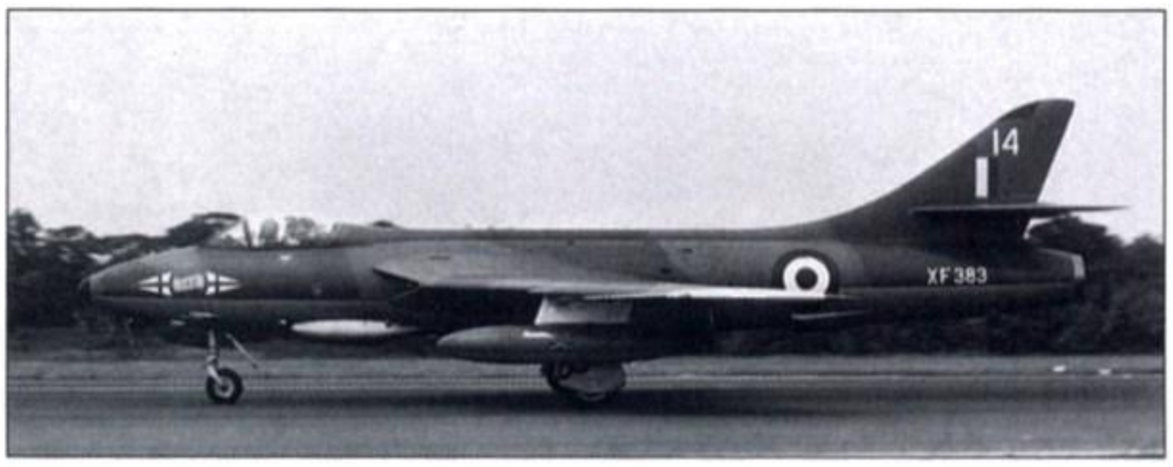
No. 63 Sqn was a No. 229 OCU shadow unit from 1963 until 1974. This is an F.Mk 6 based at RAF Chivenor in 1971.

No. 229 OCU

No. 229 OCU formed out of No. 226 OCU as an operational training unit for newly trained fighter pilots. It moved from Leuchars to Chivenor in March 1951. The unit gained Hunter F.Mk 1s in February 1955 and had retired its last Sabres by May 1956. The unit retained Hunters until 2 September 1974, when it moved to Brawdy as the Tactical Weapons Unit. The first Hunter course began in May 1955. The unit initially maintained 26 Hunters, 20 Vampire FB.Mk 5s, 10 T.Mk 11s and five Mosquito target tugs. No. 229 gave FTS graduates (with some 300 flying hours) 26 hours on the Vampire T.Mk 11, followed by tactical flying on the FB.Mk 5, prior to conversion to the Hunter. Conversion consisted of an exam (with a 90 per cent pass mark), a ground-based check-out, three start-ups and cockpit checks, than a first solo (there being no two-seat Hunter at the time). A six-hour familiarisation phase included transonic flying, and was followed by a 14-hour tactical phase.

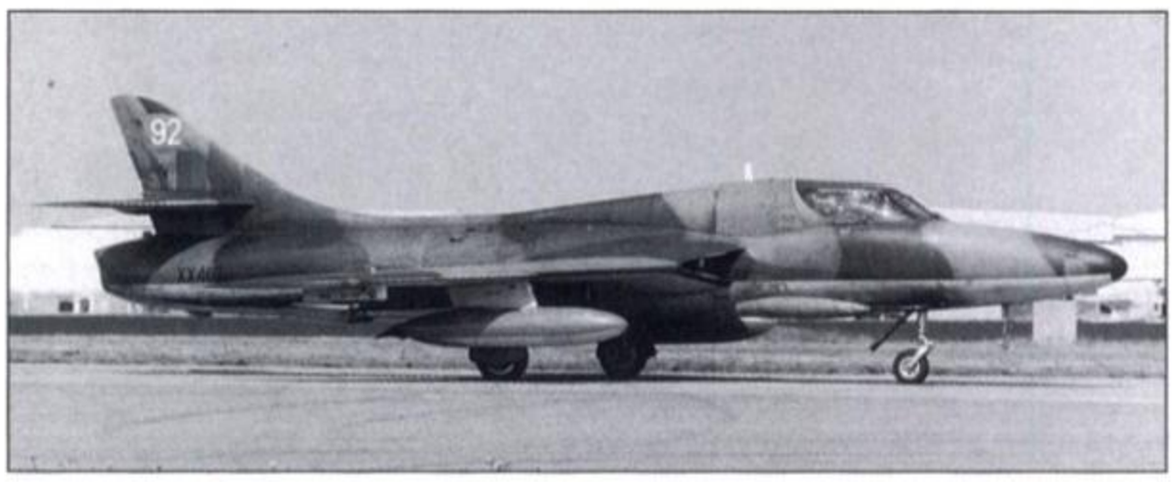
The OCU was initially given the shadow identity of No. 229 Squadron, becoming No. 127 Squadron in November 1957. A second squadron formed within the OCU in October 1958, and a third in early 1967. No. 229 OCU's constituent squadrons were given shadow identities including No. 127 Squadron (later No. 234 Squadron), No. 131 Squadron (later No. 145 Squadron, later No. 63 Squadron) and No. 79 Squadron. Hunter T.Mk 7s replaced Vampire T.Mk 11s from August 1958, F.Mk 6s replaced F.Mk 4s

Hunter Operators

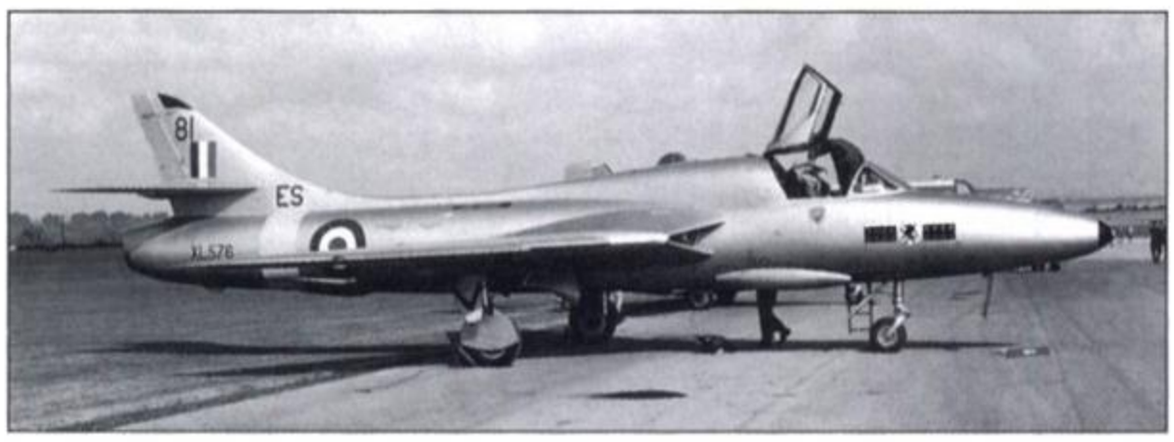


With the markings of No. 145 ('Shadow') Sqn on its nose, this F.Mk 6 is a No. 229 OCU aircraft, seen some time between 1958 and 1963.

This early production T.Mk 7 XL571 was photographed in 1976/77, during its second period of service with No. 229 OCU.



Two T.Mk 70s that had served in the Saudi and Jordanian air forces (re)joined the RAF in 1972. XX467 was originally T.Mk 7 XL605 and served with No. 229 OCU at Brawdy, coded '92', on its return to the UK.



After a brief period as a 2TAF Hunter unit, No. 234 Sqn became a Shadow squadron within No. 229 OCU, and remained so until the disbandment of the the OCU's TWU successor. This Mk 7 carries the 'ES' codes used by the OCU until about 1960.

from 1961 and FR.Mk 10s replaced Meteor PR.Mk 10s in 1965. The Hunters were maintained by two servicing squadrons, with the F.Mk 6s operated by No. 1 Servicing Squadron and the T.Mk 7s and FGA.Mk 9s by No. 2. No. 1 Squadron applied unit codes in black on a yellow disc on the fin, and on a yellow-painted nosewheel door. Servicing was centralised from November 1976.

No. 233 OCU

Formed at Pembrey in September 1952 to provide operational training for fighter pilots prior to type conversion, No. 233 OCU was originally equipped with Vampires, but gained Hunter F.Mk 1s before disbanding on 1 September 1957. This was a direct result of the reduced need for pilots caused by the 1957 Defence White Paper. The unit's aircraft wore yellow codes and wingtips. The unit had a brief second incarnation with Hunters from 1 October 1970, when it reformed from the Harrier Conversion Unit, which still had a handful of Hunter hacks on charge.

No. 237 OCU

Reformed on 1 March 1971 at Honington, No. 237 OCU was the Buccaneer conversion unit, and also used Hunter T.Mk 7s for training and instrument flying due to the lack of dual-control Buccaneers. During 1980 and 1981 the unit ceased training new aircrew while the Buccaneers were grounded, and gave staff continuation training on an expanded fleet of Hunters. The unit moved to Lossiemouth on 19 October 1984. No. 237 OCU disbanded on 1 October 1991, passing the reduced training commitment to a dedicated flight within No. 208 Squadron.

Harrier Conversion Unit

The Harrier Conversion Team formed on 1 January 1969, becoming the Harrier Conversion Unit on 1 April 1970 and then being redesignated as No. 233 OCU on 1 October 1970. Throughout this time, the unit had a handful of Hunter FGA.Mk 9s on charge in addition to its Harriers. They were used mainly by instructors for chase duties, since there were then no two-seat Harriers. The unit badge was a yellow grasshopper, applied below the fuselage.

Central Fighter Establishment

The Central Fighter Establishment at West Raynham had a number of constituent squadrons, including the Air Fighting Development Squadron (AFDS) and the Day Fighter Leader's School. The AFDS received its first Hunter in July 1954, and subsequently used every RAF Hunter variant, except the FR.Mk 10. In 1965 at least one Hunter (F.Mk 6 XF527) wore the unit's black-and-red fuselage bars flanking its roundels.

The Day Fighter Leader's School (DFLS) received Hunters in 1955. 'A' Flight painted the spines of its Hunters red, with matching chord-wise bands across the wings and tailplanes; 'B' Flight used yellow. By the end of 1956, the coloured flight markings had spread to cover the entire fin and tailplanes (but not usually the rudder or elevators). The DFLS was redesignated as the Day Fighter Combat Squadron on 15 March 1958. The DFCS used the shadow designation No. 122 (Reserve) Squadron until July 1959, when it became No. 63 (Reserve) Squadron, the new identity being used until the move to Binbrook. From 1961, Dayglo orange replaced red on the spine, tail and wings, and 'B' Flight may have used the short-lived fluorescent green Dayglo.

The whole CFE moved to Binbrook in 1962 and disbanded on 1 February 1966, with AFDS becoming the Fighter Command Trials Unit. By that time, only two Hunter F.Mk 6s were on charge.

Fighter Weapons School

The Fighter Weapons School formed in January 1955 from the Central Gunnery School, and added Hunters to its establishment in 1956. It moved to Driffield in October 1957, but was absorbed by the Central Fighter Establishment in March 1958.

Tactical Weapons Unit

No. 229 OCU was redesignated as the Tactical Weapons Unit when the unit moved to RAF Brawdy in 1974. The same shadow squadrons remained assigned – Nos 63, 79 and 234. The unit maintained responsibility for mounting occasional detachments of Hunters to Gibraltar, flying air defence and fighter reconnaissance missions over the eastern Mediterranean. A reduced throughput of pilots to the front line (due mainly to Brawdy's atrocious weather), just as the demand for fast-jet aircrew began to increase, prompted the division of the TWU into two units: No. 1 TWU formed at Brawdy on 31 July 1978, and No. 2 TWU formed at Lossiemouth the same day.

No. 1 TWU

No. 1 TWU formed at Brawdy on 31 July 1978, just as the Hawk was beginning to supplant the ageing Hunter. Hawks were initially used for instructor training, entering service with No. 234 Squadron in May 1978. No. 63 Squadron graduated its last Hunter course in May 1979. Thereafter, all *ab initio* pilots at Brawdy trained on the BAe Hawk. QWIs, foreign students and senior officers on refresher courses continued to fly the Hunter with No. 79 Squadron until May 1984. The last five FGA.Mk 9s and two T.Mk 7s were ferried to St Athan on 24 July 1984, although a handful of F.Mk 6As and more T.Mk 7s remained in use until September (and perhaps beyond) as hacks and target tugs, and for instructor continuation training.

No. 2 TWU

No. 2 TWU formed at Lossiemouth on 31 July 1978 upon the transfer of 30 Hunters from Brawdy, as a parallel to No. 1 TWU, and was intended to increase the throughput of trainee pilots. It was equipped solely with Hunters until it officially disbanded at Lossiemouth on 1 April 1981, with the last Lossiemouth course ending in May. No. 2 TWU reformed with Hawks at Chivenor the same day, and the Hunters flew back to Brawdy on 13 April. The aircraft wore no distinctive unit markings.

Central Flying School

The RAF's Central Flying School has always been responsible for training, rating, standardising and examining flying instructors throughout the RAF. During the late 1950s and 1960s, CFS maintained examples of the most common RAF aircraft types for use by the 'Trappers', within a type flight. It also used front-line types on the Handling Squadron, which was responsible for the compilation and updating of pilot's notes. CFS Hunters usually wore standard Fighter Command colours, often without unit markings or titles, but occasionally with the CFS type flight logo and pelican badge.

No. 4 Flying Training School

From 1967, the Gnat-equipped No. 4 FTS included a squadron (No. 3) equipped with Hunter F.Mk 6s and T.Mk 7s. Its primary task was to train overseas students, but it also trained RAF pilots who were too big for the tiny Gnat. The Hunters were replaced by BAe Hawks from 1976.

Initially painted in standard camouflage, from 1973 the No. 4 FTS Hunters were painted in high-visibility red, white and grey. The aircraft wore the unit's palm tree and pyramid badge on a white disc on the tail. Camouflaged aircraft had their two-digit codes on a similar disc on the nose.

Empire Test Pilot's School

The ETPS has used a host of Hunters since the mid-1950s, in a host of colour schemes. Long-term aircraft wore a standard MoD(PE) scheme with overall red fuselage, wings and tailplanes; white spine and fin were introduced during the late 1960s and 1970s; later, the scheme moved to overall light grey, with a red spine, fin and cheat line. More recently, ETPS Hunters have received the new standard MoD(PE) colour scheme, featuring dark blue undersides, red tail unit, broad cheat line and wingtips, and white upper surfaces. One Hunter remains on ETPS charge for swept-wing spinning exercises, following the loss of the second in 1998. There remains the possibility that the ETPS will receive another second Hunter, perhaps from a civilian source.

A&AEE

The Aeroplane and Armament Experimenta. Establishment (and its successors) have used large numbers of Hunters as both long- and short-term trials aircraft. The long-term night attack testbed (WV383 *Hecate*) was grounded in late 1998, subsequently being placed on display. In 2000 ex-Luftwaffe Alpha Jets were acquired to take over most of DERA's fast-jet tasks.

RAE

The Royal Aircraft Establishment has used Hunters for a wide variety of tasks, from various out-stations and from Farnborough. Principal operators have included the Institute of Aviation Medicine, Avionics Flight (which used the sole T.Mk 12, built as a TSR.2 support aircraft), and even the Radar Research Establishment.

Royal Navy

The Royal Navy has used a variety of Hunters, principally 41 two-seat T.Mk 8s and 40 specially acquired GA.Mk 11s. The aircraft equipped a number of second-line units and operated principally in the pilot training and weapons instructor training roles.

Single-seaters were delivered in a high-gloss scheme with dark sea grey upper surfaces and white undersides, with white serials, titles, deck letters and codes. The last FRADU aircraft sported overall matt Dark Sea Grey with toned-down national insignia and black codes, etc., from about 1984. Two-seaters were originally painted in a silver and Dayglo scheme, silver being replaced with light grey in the early 1970s. Some two-seat aircraft wore the dark sea grey and white and overall matt dark grey finishes. The FONAC VIP 'admirals barges' wore a blue-and-white colour scheme.

FRADU operated the 'Blue Herons' display team, comprising four GA.Mk 11s, from 1975 until 1980.

Nos 700B, 700Y and 700Z Squadrons

The No. 700 Squadron designation has been applied to a number of intensive flying trials units, whose role has been to prepare for the introduction into service of various aircraft types. Hunters have been used by No. 700B (alongside Buccaneer S.Mk 2s at Lossiemouth, during 1965), No. 700Y (alongside Sea Vixen FAW.Mk 1s at Yeovilton, during late 1958 and early 1959), and No. 700Z (alongside Buccaneer S.Mk 1s at Lossiemouth, during 1961 and 1962).

No. 736 Squadron

No. 736 Squadron briefly operated a handful of Hunter T.Mk 8s in the training role, principally converting US-trained pilots to British types, and providing instrument flying training to Lossiemouth-based pilots. The Hunters augmented the unit's Sea Hawks.

No. 738 Squadron

Hunters replaced No. 738's refresher- and instrument-training Sea Hawks in June 1962, and the unit assumed a general advanced training role. No. 738 moved from Lossiemouth to Brawdy on 1 January 1964, and thereafter provided Phase II of the Advanced Flying Training Course, plus a four-aircraft formation display team, the 'Rough Diamonds'. It disbanded on 8 May 1970.

No. 738's Hunter T.Mk 8Bs and GA.Mk 11s wore a white Pegasus badge; the 'Rough Diamonds' team leader's aircraft had a Dayglo nose, spine and wingtips.

No. 759 Squadron

No. 759 reformed at Brawdy on 1 August 1963, equipped with Hunter T.Mk 8s. It provided the first phase of the Advanced Flying Training Course, before disbanding on 24 December 1969.

No. 738's Hunters wore a tiny representation of the squadron's torch and crossed swords insignia.

No. 764 Squadron

Lossiemouth-based No. 764 provided commanding officer and senior pilot training and refresher courses, and functioned as a target-towing unit and jet fighter pilot pool. Hunters augmented Sea Hawks from December 1958, and replaced them in July 1959. A handful of Scimitars were also used during 1959. The principal task of the unit changed to AWI training from March 1959. The squadron disbanded on 27 July 1972.

No. 738's Hunter T.Mk 8Bs and GA/PR.Mk 11s wore green and white nose checks, flanking the squadron's scales badge.

No. 800 Squadron

No. 800 Squadron's No. 800B Flight used Scimitars for inflight-refuelling trials, operating from Lossiemouth. The unit included at least one hack Hunter T.Mk 8.

No. 899 Squadron

No. 899 Squadron, the Sea Harrier Headquarters squadron and training unit at Yeovilton, operated a pair of Blue Fox-equipped Hunter T.Mk 8Ms (of three converted) from August 1981 until October 1993. The aircraft wore the squadron's winged fist insignia.

FRU/FRADU

As they were phased out of service with the Royal Navy's training units, Hunters were taken on charge by the Fleet Requirements Unit at Hurn, replacing Scimitars from March 1969. The unit moved to Yeovilton on 16 October 1972, merging with the Air Direction Training Unit (which also operated a handful of Hunters from June 1970). The combined unit was redesignated FRADU. The unit was operated under contract, initially by Airwork and later (from 1983) by Flight Refuelling. The unit formed and operated a formation display team, the 'Blue Herons', from 1975, and ran the SMAC309 Sea Harrier assessment course for helicopter pilots being considered for retraining to fly the Sea Harrier. By 1984, the unit operated some 14 Hunter GA.Mk 11s and eight T.Mk 8s, together with Canberra TT.Mk 18s and T.Mk 22s. Hunter numbers remained fairly constant, and some 12 GA.Mk 11s and nine T.Mk 8s were in use at the end of 1987.

The Canberras gave way to Dassault Falcons, and the first BAe Hawks arrived in May 1994, prior to the relocation of FRADU from Yeovilton to Culdrose. The Hunters were retired prematurely with the arrival of the more fuel-efficient Hawks, being replaced on a one-for-one basis. The last Hunters were retired in January 1995.

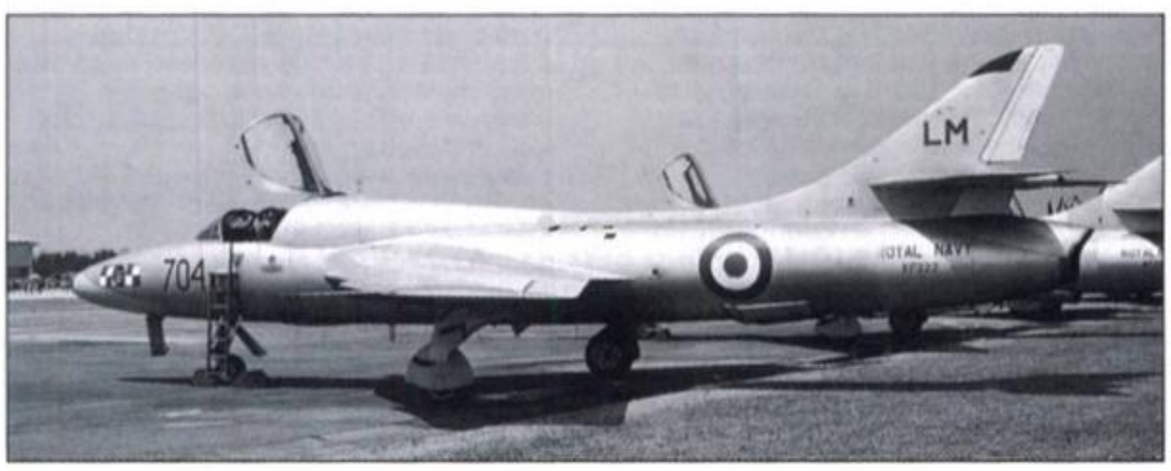
FRADU aircraft wore no unit markings, but ADTU Hunters wore a twin gold speedbird device, sometimes on a maroon chevron.

Miscellaneous units

Hunters (mainly T.Mk 8s) were also used by the Lossiemouth and Yeovilton Station Flights, by Flag Officer Naval Air Command and Flag Officer Training; by the Royal Navy Air Holding Unit at Tengah, Singapore during the early 1960s; and by the Naval Aircraft Servicing Unit at Changi, Singapore in the late 1960s.

Above: The Pegasus emblem on the nose of WV374 is that of No. 738 NAS, based at RNAS Brawdy in the late 1960s.

Above: FRADU Hunter T.MK 8C XF289 is finished in the Light Aircraft Grey colour scheme adopted for FAA two-seat Hunters from 1969.



Above: The green/white checks on the nose of this T.Mk 8 are those of No. 764 NAS at RNAS Lossiemouth. Finish is gloss Aluminium overall.

Seen in 1984, PR.Mk 11 WT723 carries '8xx' codes used by FRADU aircraft.

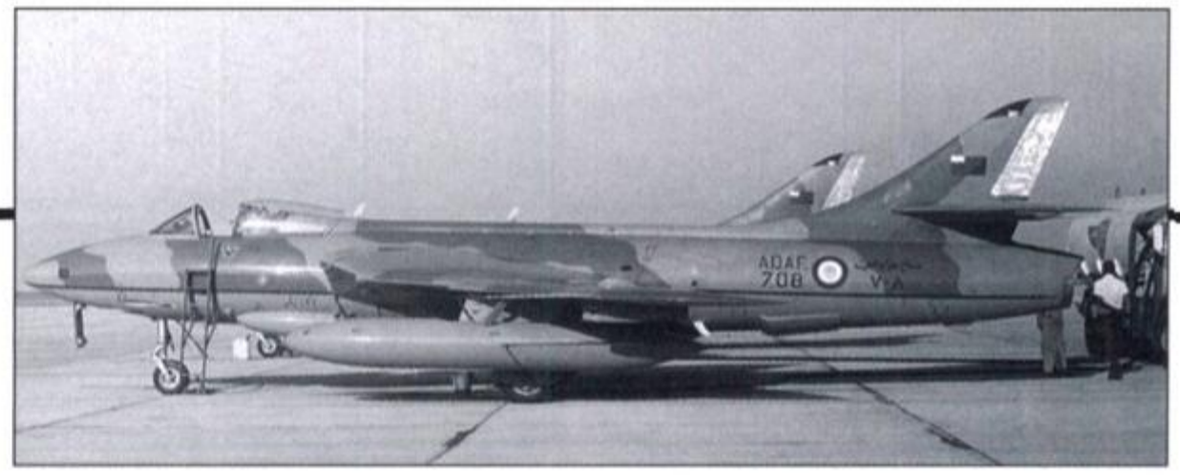
Below: The three T.Mk 8Ms of No. 899 NAS were finished in an Extra Dark Sea Grey/White scheme to match the Sea Harrier FRS. Mk 1s of the same unit.

Abu Dhabi

Abu Dhabi Air Force

Abu Dhabi ordered seven FGA.Mk 9 standard single-seaters in 1969, which were delivered in November 1970, equipping a fighter squadron of the Abu Dhabi Army Air Wing at Sharjah. The aircraft went straight into action, flying defensive patrols during the long-running border dispute with Saudi Arabia. Such patrols began in May 1970, with RAF No. 208 Squadron Hunters (on APC at Sharjah), before the Abu Dhabi aircraft were delivered. The Hunters were refurbished, converted former RAF aircraft (designated FGA.Mk 76 by Hawker Siddeley), and were serialled 701-707. They were accompanied by three reconnaissance-capable aircraft (708-710) known as FR.Mk 76s, and two T.Mk 77 trainers (711 and 712). The Hunter squadron was initially manned by seconded RAF pilots, but local pilots were also recruited and trained. The Hunters were replaced in the air defence role by 32 Dassault Mirage 5s, but were then used in the ground attack role, until finally replaced by Hawks in 1983. The surviving aircraft were then transferred to Somalia.

Abu Dhabi's Hunters wore Sand and Middle Stone disruptive pattern desert camouflage on the topsides, with Azure Blue undersides. The upper and lower surface colours were divided on the fuselage by a narrow red cheat line. The aircraft had Army Air (later ADAF) titles and serials in Western script forward of the fuselage roundel, and in Arabic aft. The national roundel was carried in six positions (both sides of the fuselage and above and below each wing), with the flag as a fin flash. Aircraft retained Abu Dhabi markings even though the country had become part of the United Arab Emirates, with nominally pooled armed forces and a new unified roundel and fin flash.



Abu Dhabi operated Hunter FGA.Mk 76s (below) and FR.Mk 76s (above).

Belgium

Belgische Luchtmacht/ Force Aérienne Belge

Belgium and the Netherlands both built Hunters under licence with US government Offshore Procurement Programme funding. A brand new F.Mk 4 was delivered as a pattern aircraft on 16 March 1955 (as ID-1). Belgian Hunters (built locally by SABCA and Avions Fairey, and taken from the Dutch Fokker line) entered service in 1956. F.Mk 4s were serialled ID-1 to ID-64 and ID-101 to ID-148 (112 aircraft), and the F.Mk 6s from IF-1 to IF-144 (144 aircraft).

The Belgian and Netherlands air forces trained jointly, and thus Belgium never received T.Mk 7s. The Belgians replaced their Hunters with CF-100 all-weather interceptors (1st Wing at Beauvechain) and Nike Hercules SAMs (9th Wing at Bierset) from 1959, and the remaining fighter-bombers of 7th Wing at Chièvres served only until 1963.

Belgian Hunters were delivered in RAF-style camouflage, with roundels in the usual six positions and a tricolour fin flash. Colourful squadron markings were usually applied to the nose, and the aircraft often featured coloured wingtips. Serials were applied in small white digits on the rear fuselage, but aircraft often also had larger three-digit codes on their noses. Serials were applied in black under the port wing, and in white over the starboard wing, always inboard from the roundels and perpendicular to the aircraft centreline. Aerobatic team Hunters wore a smart overall gloss red colour scheme, with no wing serials.

1st Wing

The 1st Wing at Bevekom included the two squadrons which had been formed with Belgian personnel within the Royal Air Force during World War II, Nos 349 and 350 Squadrons. They retained their RAF-style unit identities and insignia. By early 1957, the wing had three Meteor F.Mk 8 squadrons and two (10 and 11 Smaldeel) equipped with the Meteor NF.Mk 11. The wing lost 4 and 10 Smaldeel with the arrival of the Hunter F.Mk 4 in 1957, leaving No. 349 Squadron, No. 350 Squadron and 11 Smaldeel. These units briefly operated the Hunter F.Mk 4s discarded by the 7th Wing when it converted to the later and far superior F.Mk 6. The wing re-equipped with Avro Canada CF-100s within a year.

11 Smaldeel used a grey bat and yellow triangle insignia, while the other units used adaptations of their RAF crests. Some No. 350 Squadron aircraft wore a highly stylised, semi-abstract representation of the unit's Gaul's head badge (or perhaps just of the wings on his helmet) in red, outlined in white. Towards the end of their service, the squadron's Hunters also gained a row of small red arrowheads along the wingtip edge.

7th Wing

The 7th Wing's three constituent squadrons (7, 8 and 9 Smaldeel) replaced their Meteor F.Mk 8s with Hunter F.Mk 4s in mid-1956. The unit functioned as a front-line unit and as the Hunter OCU (7eme Ecole de Chasse).

Each of the three squadrons used the wing's origami cygnet badge (based on the personal insignia of World War I ace Willy Coppens) in silver on its aircraft, with a different background colour – red for 7 Smaldeel, blue for 8, and green for 9. For most of its brief use, this background colour consisted of a coloured nose aft of the ranging radar, tapering back to a vestigial and abbreviated cheat line. Originally, 7 Smaldeel aircraft wore 7J- prefix three-letter codes. Towards the end of the unit's life, the aircraft of 7 Smaldeel had red-and-white checked wingtips. 8 Smaldeel used the code OV- (and blue and white wingtip checks) and 9 Smaldeel used S2- codes.

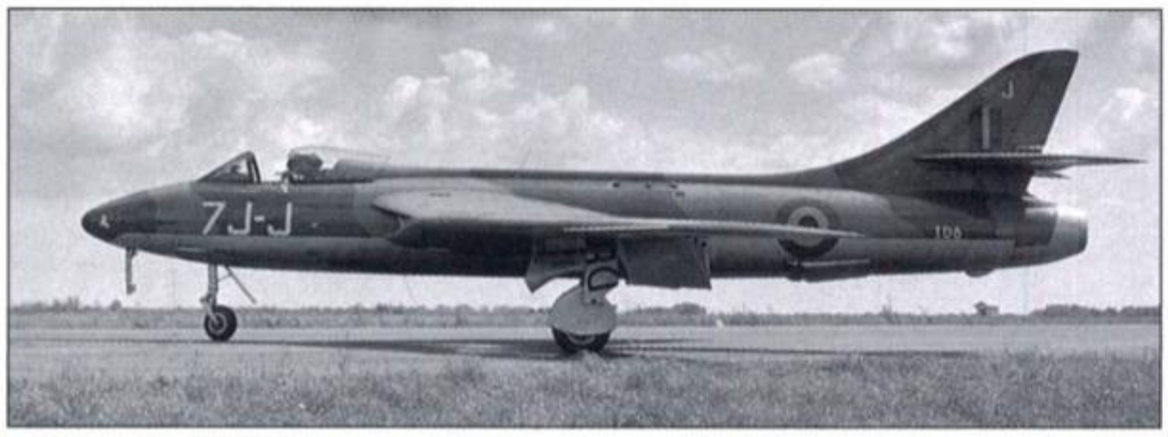
9 Smaldeel disbanded in March 1957, just before the wing re-equipped with Hunter F.Mk 6s. The wing relinquished its Hunters and disbanded at Chièvres in November 1963. The 7th Wing maintained a Hunter aerobatic team, led by Major Bobby Bladt (who had previously formed and led the 1st Wing's 'Acrobobs' Meteor team). The new team, known as the 'Rode Duivels' or 'Diables Rouges' (Red Devils) initially operated five red Hunters; the number eventually grew to 16, before the perceived risk of a collision forced a return to a five-aircraft team (four plus a solo). The team flew its final performance on 4 October 1963.

The team's aircraft were bright red overall, with a white nosecone and cheat line back to the intake, continuing from the wing trailing edge back to the jetpipe. The whole fin and undersurface of the wing were painted in Belgian black/yellow/red national colours, with the central stripe tapering and slightly swept. A gold-outlined black shield on the nose contained a heraldic lion badge.

9th Wing

The 9th Wing at Bierset traded F-84Gs for Meteor F.Mk 8s in July 1956, when it became a day fighter wing. 30 Smaldeel disbanded in October 1956, leaving 22 and 26 Smaldeel to re-equip with the Hunter F.Mk 6. The wing disbanded on 30 April 1960, re-emerging two years later as a missile wing.

Unit codes consisted of IS- for 22 Smaldeel and JE- for 26 Smaldeel. Late in the 9th Wing's existence, its Hunters began to receive unit markings. 22 Smaldeel's aircraft had a pale blue speedbird motif on a white chevron on the nose. Although 26 Smaldeel's official badge was a silver bison superimposed on a red ring, its aircraft wore a simple red band around the nose aft of the ranging radar, with a serrated trailing edge.



Above: ID-8, is shown here marked for 7 Smaldeel of the 7th Wing. The unit marking (a silver cygnet of folded paper) is applied over a red nose. Most Belgian Mk 4s were rebuilt to Mk 6 standard.

Below: Five red F.Mk 6s equipped the 7th Wing's 'Rode Duivels'/ 'Diables Rouges' (Red Devils) display team. IF-132, one of the Fokker-built batch, fills the number four position in this formation.

Below: Hunter Mk 4 ID-123 stands outside a barracks at Koksijde air base, marked as '7J-P' – a 7 Smaldeel/7th Wing aircraft.

Chile
Fuerza Aérea de Chile

Chile turned to Hawker for the supply of Hunters in 1966, after the USA reneged on its promise to supply 25 F-86Fs under MDAP. Although Chile experienced periodic difficulties with Britain over the supply of spares, support and replacement aircraft, the Hunter proved extremely well suited for Chilean requirements, and the type remained in service for many years. Even as late as 1994, when Switzerland withdrew its Hunters, Chile hoped to acquire additional Hunters but, when it was unable to do so, turned to other types to meet its future needs. Chile received an initial batch of 15 FGA.Mk 71s (J-700 to J-714) between September 1967 and June 1968, followed by three FR.Mk 71As (J-715 to J-717) and three T.Mk 72s (J-718 to J-720). These trainers and reconnaissance aircraft were added to the initial contract after signature. The first aircraft equipped Grupo de Aviación No. 7, formed at Los Cerrillos in May 1968 to operate the Hunters.

Further orders brought the delivery of nine more FGA.Mk 71s in 1970-71 (J-722 to J-730), and four more (J-731 to J-733 and J-737) in 1973-74. The aircraft were accompanied by three more FR.Mk 71As (J-734, J-735 and J-738). These batches also included two T.Mk 72s (J-721 and J-736), and allowed the re-equipment of Grupo de Aviación No. 9, 'Las Panteras Negras', from 8 May 1970. Finally, the Hunter re-equipped Grupo de Aviación No. 8.

Marxist President Salvador Allende was overthrown in a coup in September 1973, during which Chilean Hunters bombed and rocketed the Presidential Palace. Arms embargoes were imposed which blocked the supply of spares, and even prevented the return of engines being overhauled in the UK. This was also the prime time for exports of newly refurbished aircraft and, without the embargo, Chile would have been expected to order many more aircraft. The number of aircraft available on the front-line units plummeted. There was no Chilean J-739, but another aircraft, J-740, was built in Chile using parts from J-700 and J-707, and the wings of J-735.

Grupo 7 re-equipped with F-5Es during the summer of 1976, and Grupo 9 deactivated in December 1981, leaving all surviving Hunters with Grupo 8. Chile had launched its Aguila Hunter upgrade in 1980, and ENAER fitted large numbers of aircraft with an indigenous Caiquen radar warning receiver and other improvements, including provision for IAI Shafrir AAMs, and an Eclipse chaff/flare dispenser that employed MJU-7/B IR flares or RR-170 chaff cartridges. A single aircraft was used by ENAER as the (non-flying) Aguila prototype, using the serial X-001. Its previous identity is unknown. 'Production' Aguilas included J-702, J-715, J-727, J-729, J-733, J-734, J-735 and J-740.

As war between Argentina and the UK loomed in the South Atlantic, the RAF airlifted eight Hunter FGA.Mk 9s to Chile in two batches of four, on 24 April and 22 May 1982. They became J-743 to J-750. Following the Falklands War, four more FGA.Mk 9s were delivered in November 1982 as J-751 to J-754. The RAF Hunters were augmented by a pair of ex-Kuwaiti T.Mk 67s (possibly taken back from Oman) which received the serials J-741 and J-742. It was assumed that the Hunters were supplied in return for 'services rendered', probably in the form of basing for RAF reconnaissance aircraft and Special Forces helicopters, C-130s and troops.

Hunter 722, the first of a batch of FGA.Mk 71s delivered in 1970/71, has a Caiquen radar warning receiver fitted to its tailfin. Behind is T.Mk 72 718 – one of three delivered in the late 1960s.

The last Chilean Hunters were officially retired in a ceremony in April 1995, which also celebrated the arrival of the Dassault Mirage 5M Elkan. Two FR.Mk 71As and two two-seaters performed a farewell flypast, but were then kept on for limited tactical reconnaissance and training duties, pending delivery of Chile's unmodernised, reconnaissance-capable Mirage 5BRs.

Chilean Hunters were delivered in RAF-type camouflage, with their serials presented as large black buzz numbers on the rear fuselage, or in small white numerals on the tailfin. J- prefixes were removed in 1982, and serials were reduced in size from 1992 to 1993. Rudders have tended to be dark blue, wearing a single small white star. The national insignia was carried above the starboard and below the port wing, with the serial opposite.

In 1975 a single Grupo 9 aircraft, J-703, was painted in an experimental air superiority camouflage, with F.S.35550 and F.S.35526 disruptive paint. J-702 and J-718 received experimental desert camouflage colour schemes in the late 1970s and early 1980s.

Denmark
Kongelige Danske Flyvevåbnet

Denmark ordered Hunters on 3 July 1954, four days after Sweden ordered the type. A brand new RAF F.Mk 4 sent to Denmark for evaluation was retained for service alongside 30 new-build F.Mk 51s, delivered from January 1956. The aircraft were equivalent to early RAF F.Mk 4s, without extended, dogtooth leading edges. They were augmented by two new T.Mk 53s delivered in 1958 (again without dogtooth) and two ex-Dutch T.Mk 7s (delivered directly from the Netherlands in 1968 and 1969). The Danish Hunters equipped No. 724 Squadron at Aalborg, and moved with the unit to Karup and Skydstrup. Spares and servicing were underfunded, and this (coupled with normal attrition) had reduced the fleet to about 10 effective aircraft by the time No. 724 Squadron disbanded on 31 March 1974. One aircraft was retired to the RDAF museum, and Hawker Siddeley purchased the 20 survivors but, unusually, none was refurbished for resale. The aircraft were apparently in a poor technical condition, and many were refurbished for static display and presented to museums or allocated as gate-guards.

Danish Hunters were delivered in RAF-style camouflage, with a white three-digit serial aft of the fuselage roundel. Serials gained an E- or ET- (two-seaters) prefix and migrated to the nose in 1968, and squadron markings appeared on the tailfins. In the early 1970s the aircraft were painted in matt olive drab overall, serials were toned down in black, and national markings were reduced in size.

F.Mk 51 E-427 is seen in this post-1968 view. Though 20 RDAF Hunters were repurchased by HSA in the mid-1970s, none was refurbished due to their poor condition.

India
Indian Air Force

India's first Hunters were 16 F.Mk 6s taken directly from RAF stocks (held in MUs) and delivered as F.Mk 56s BA201 to BA216. They were followed by 32 aircraft already taking shape on the Kingston line as RAF F.Mk 6s. These aircraft were modified with gun blast deflectors and T.Mk 7-style braking chutes on the production line, and were delivered as BA217 to BA248. The original aircraft were retrofitted in service. The first F.Mk 6 was delivered on 11 October 1957, and aircraft were ferried to India by IAF pilots who underwent conversion at Dunsfold. The original Indian order included 22 two-seaters (fitted with Avon 203 engines), which were delivered from February 1959 as BS361 to BS376 and BS485 to BS490.

No. 7 Squadron began conversion to the Hunter at the end of 1957. Although the IAF was (of course) a jet air force, significantly it was not 'all-jet', and No. 14 Squadron relinquished Spitfire Mk XVIIIs at the end of 1957, prior to re-equipping with the Hunter. By the end of 1961, seven squadrons were operational on the Hunter, consisting of Nos 5, 7, 14, 17, 20, 27 and 37. They saw long and distinguished service, and performed with distinction in the various wars with Pakistan. At one stage, Nos 5 and 17 were based at Poona, with Nos 7, 20 and 27 at Ambala. A massive Hunter OCU was based at Ambala (later Kalaikunda). Nos 3 and 31 Squadrons at Jamnagar are reported to have operated Hunters as target tugs.

Following the 1965 war with Pakistan, India placed several follow-on orders for refurbished Hunters, modified to FGA.Mk 9 standard as FGA.Mk 56As. Thirty-six aircraft were ordered in 1965, as A459 to A494. Eleven more followed in 1967, as A936 to A943 and A967 to A969. Six more were ordered in 1968, as A1010 to A1015. Additional two-seaters were ordered in 1966 (12 T.Mk 66D aircraft, serialled S570 to S581) and 1973 (five T.Mk 66Es, serialled S1389 to S1393).

Nos 7, 17 and 37 re-equipped with MiG-21s during the 1970s (probably from 1973), and No. 14 became the first Indian Jaguar squadron in 1979. The final Hunters in Indian service were operated by the Hunter Operational Flying Training Unit (HOFTU) and No. 20 Squadron, which provided the air force's aerobatic team, the 'Thunderbolts'. HOFTU and MOFTU (MiG OFTU) provided advanced tactical and weapons training to student pilots graduating from the Kiran and Iskra, before they converted to front-line types. HOFTU was responsible for training pilots destined for Western types, including the Jaguar and Mirage 2000, while the MiG-21-equipped MOFTU provided training for MiG-21, -23, -27 and -29 pilots.

HOFTU has now disbanded, leaving a gap in India's pilot training programme. The Air Force had favoured acquiring BAe Hawks to take over from the Hunters, but the Mikoyan MiG AT now seems a strong contender. The 'Thunderbolts' officially stood down in 1988, but was not replaced by the 'Surya' Kiran team until 1996, and may have continued for some time after its formal disbandment.

Although often described as having been retired, Indian Hunters were still in service in late 1999. Some eight former No. 20 Squadron Hunters remained in use at Kalaikunda, operating in the target facilities, staff continuation training and general duties role, even though No. 20 Squadron has long been a MiG-27 unit.

Indian Hunters generally wore RAF-style camouflage, with silver undersides. The aircraft of the 'Thunderbolts' team wore a overall blue colour scheme, with prominent white lightning flashes on fuselage, wings and tail unit. The saffron/white/green national roundel was carried in six positions (both sides of the fuselage and above and below each wing), with a similarly coloured fin flash. The application of squadron markings followed RAF practice, but was relatively uncommon. No. 5 Squadron applied its 'Tuskers' badge on the nose, with a white-edged red chevron on the rear fuselage, aft of the roundel.

'Banners' is the name under which the IAF's Target Tug Flight at Kalaikunda continued to operate eight Hunters in late 1999. T.Mk 66D S573 heads this line-up of aircraft, which includes F.Mk 56 BA312A and FGA.Mk 56A A476.

Iraq
Iraqi Air Force

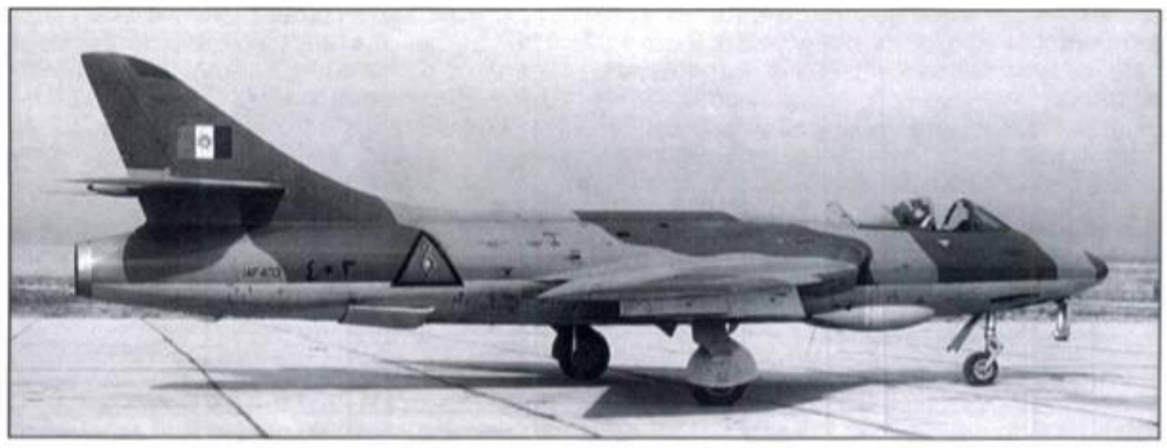
The US funded Iraq's initial Hunter order, for 15 F.Mk 6s (serials 394-409) from RAF stocks delivered in two batches during 1958. Between 1964 and 1966, Iraq ordered 42 more refurbished Hunters in a batch of 24 FGA.Mk 59s (serials 570-587 and 628-633) and 18 FGA.Mk 59As (657-661 and 690-702). Iraq borrowed Hawker's two-seat demonstrator, G-APUX, for almost a year, and ordered five T.Mk 60s (567-569 and 626-627), which were delivered in 1963, 1964 and 1965. They were followed by four reconnaissance-configured FGA.Mk 59Bs (662-664 and 689).

During the 1967 war with Israel, Iraq's Hunter force was reinforced by the pilots of the Royal Jordanian Air Force's Hunter squadron, whose aircraft were destroyed on the ground in Israel's pre-emptive strike against its neighbours. The Iraqi/Jordanian Hunters seem to have performed well, once Israeli propaganda claims are stripped away to reveal the facts. One Pakistani pilot, Flight Lieutenant Saiful Azam, on exchange with the Jordanians and attached, with them, to the Iraqi air force, scored four kills, comprising a Mirage III, a Vautour and two Super Mystères. The Iraqis lost some Hunters during the war, and seven more aircraft (five in the air and two on the ground) in the 1973 Yom Kippur War, but scored 12 air-to-air kills.

Large numbers of Hunters remained active into the 1970s, when they were replaced by Su-7s and relegated to the operational training role. The date of their withdrawal remains a matter for speculation.

The traditional triangular air force insignia was carried in six positions (both sides of the fuselage and above and below each wing), with the national flag as a fin flash. This latter initially comprised vertical black/white/green bars, with a red eight-pointed star outlined on the central white bar. The new flag was carried from 1962, with horizontal red/white/black bars (top to bottom). Until 1963 this flag carried three green-outlined eight-point stars, with three solid five-pointed green stars replacing these in 1963.

Above: Iraq's five T.Mk 59s and most of its single-seat Hunters were former Belgian machines.



Below: IAF 403 was among the 15 F.Mk 6s delivered from RAF stocks. Ex-XK146, it saw no RAF use.

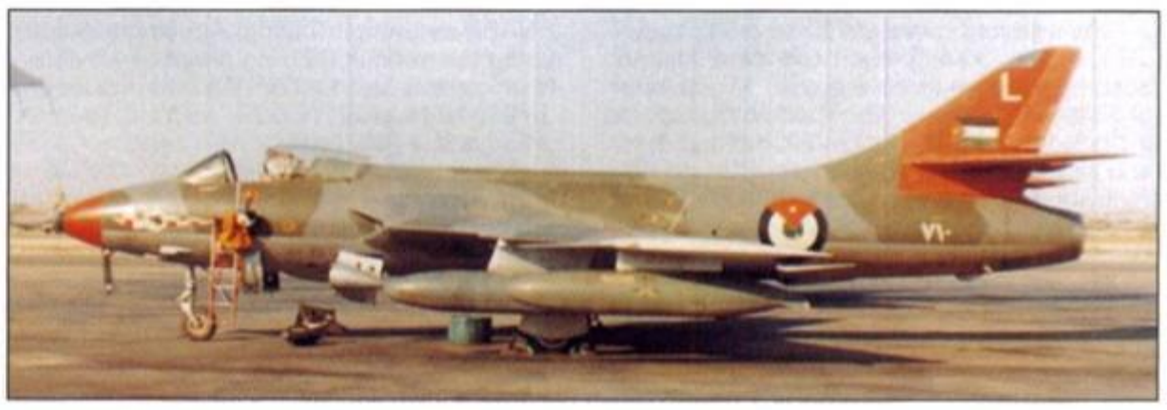
Jordan
Royal Jordanian Air Force

Jordan's first Hunter order (for 12 F.Mk 6s) was placed in 1958, allowing the re-equipment of No. 1 Squadron. Three T.Mk 66Bs were ordered in 1960, re-equipping No. 6 Squadron, which functioned as an OCU. No. 6 Squadron also used the Hawker two-seat demonstrator (G-APUX) for one year, on loan. An ex-RAF FR.Mk 10 was transferred to Jordan in 1960, and a second was delivered in 1961. No. 2 Squadron reformed with 12 FGA.Mk 9s transferred from RAF stocks in 1962. Eight ex-RAF F.Mk 6s were upgraded to FGA.Mk 9 standards and delivered as FGA.Mk 73s. It has been reported that the late King Hussein (an extremely accomplished pilot, already qualified on the Vampire) checked out in the single-seat Hunter. In 1964, the squadron formed a nine-aircraft aerobatic team – the 'Hashemite Diamond'.

Most Jordanian Hunters were destroyed on the ground or too badly damaged to fight at the start of the 1967 war, and one was shot down by Israeli fighters. (Another had been shot down before the war, by intruding IDF/AF fighters.) One pilot was killed when his aircraft was strafed as he waited to line up for take-off. Jordanian pilots therefore joined the Iraqi Hunter force for the duration of the war, claiming four confirmed and two probable kills for the loss of a single Jordanian-flown Hunter.

After the war, Jordan received three ex-Saudi F.Mk 6s and four RAF FGA.Mk 9s. The country ordered additional refurbished Hunters from Hawker, consisting of 12 FGA.Mk 73As and three FGA.Mk 73Bs, delivered by 1971. The Hunters were replaced by F-5Es from 1972, while the OCU re-equipped with T-37s in 1974. In 1975, 31 surviving Jordanian Hunters were transferred to Oman.

Jordan's Hunters wore standard RAF camouflage, with the characteristic roundel carried in six positions. The national flag was carried on the fin, in lieu of a fin flash. Some of the aircraft wore squadron markings on their noses, within a checked chevron, and some had checkerboard markings on their rudders and wingtips. A handful had red nose trim and tailfins.



RJAF 710, seen here in No. 1 Sqn markings, was among the original dozen ex-RAF Mk 6s delivered in 1958, its RAF serial having been XF380.

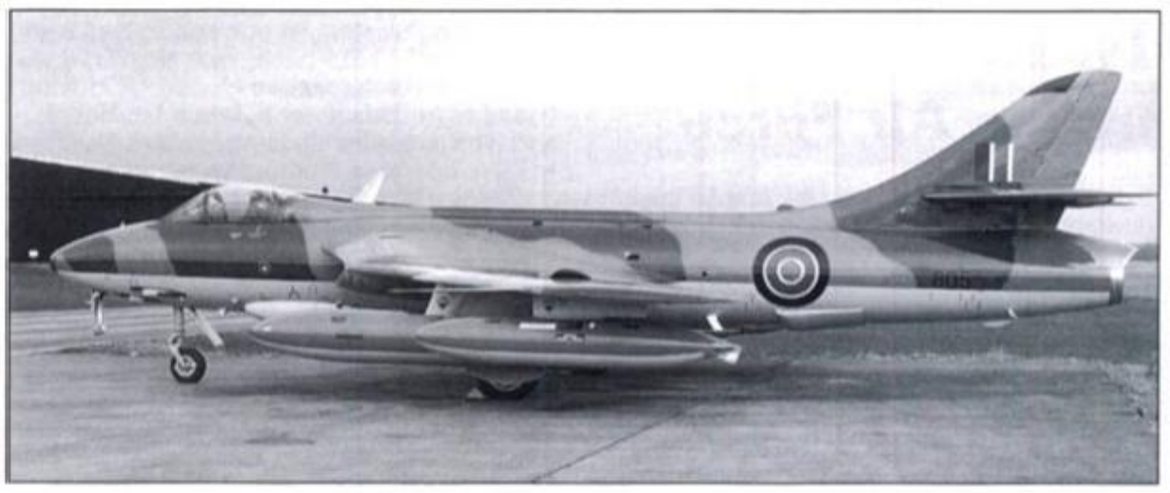
RJAF 800 was the first of three T.Mk 66Bs delivered to No. 6 Sqn – the Hunter OCU – and is likely to have been among the aircraft rendered unserviceable (if not destroyed) in the Six Day War.

Kenya
Kenya Air Force

The Kenyan air force was established with British assistance soon after independence in December 1963. Ten years later, a new airfield facility was completed at Nanyuki, opening the way for the air arm to receive its first combat aircraft, in the shape of six refurbished ex-RAF Hawker Hunters. Four were single-seat FGA.Mk 80s (serialled 803-806), and the others two-seat T.Mk 81s (801 and 802). One of the two-seaters was lost in service, but the others were retired and stored in 1979, replaced by Northrop F-5s. In 1981 the surviving Hunters were sold to Zimbabwe.

The air force roundel was carried above the wings and on the rear fuselage, with a fin flash in the same colours on the vertical tail. Serials were applied in black, very small, on the rear fuselage.

Replaced by BAe Hawks, Hunter FGA.Mk 80 KAF805 joined the Air Force of Zimbabwe in 1980, as 1082 (102), but was among the nine AFZ Hunters destroyed or damaged beyond economic repair by terrorists on 25 July 1982.



Kuwait
Kuwait Air Force

The British government sold four refurbished Hunter FGA.Mk 57s to Kuwait in 1965, for the defence of the country's oilfields. Kuwait's Hunter force subsequently expanded to six FGA.Mk 57s, plus five T.Mk 67s which supported both the single-seat Hunters and Kuwait's Lightnings. The single-seat Hunters were replaced by A-4 Skyhawks in 1976, but the two-seaters continued in service, the last three being placed in storage in 1980.

Kuwait's Hunters wore the same desert camouflage as that applied to Abu Dhabi, Qatari and Saudi aircraft. The traditional air force roundel insignia was carried in six positions (both sides of the fuselage and above and below each wing), with the national flag as a fin flash.

Kuwait's second batch of three T.Mk 67s was converted from a pair of ex-KLu F.Mk 6s and an ex-RAF FGA.Mk 9. 318, nearest the camera, was originally Fokker-built N-282, purchased by HSA in August 1967.

Lebanon
Force Aérienne Libanaise

Lebanon's first Hunters were six ex-RAF F.Mk 6s, delivered in 1958 and transferred under US Offshore Procurement arrangements. They were followed by four FGA.Mk 70s and three T.Mk 66Cs refurbished at Kingston, delivered by September 1966. The Lebanese also borrowed Hawker's T.Mk 66 demonstrator, G-APUX, on a 12-month secondment. The air force received six FGA.Mk 70As as attrition replacements in 1975-77, comprising ex-RAF FGA.Mk 9s and FR.Mk 10s updated to a common standard, with Collins 618M VHF radios. Some reports suggest that three Hunters (of 10 aircraft remaining, including one single-seater) were destroyed in 1982 during attacks on Druze militia positions when Israel invaded the southern part of the country.

The 19 Lebanese Hunters were delivered in, and continued to wear, standard RAF-type camouflage. The traditional air force roundel insignia was carried in six positions (both sides of the fuselage and above and below each wing), with the national flag as a fin flash.

Lebanon's air force is believed to continue to operate a handful of Hunters. L282 was an FGA.Mk 70A and the second Lebanese Hunter to carry that serial number (the original L282 – a T.Mk 66C – became L288). The aircraft started life as an RAF F.Mk 6 and was later converted to FR.Mk 10 standard.

Netherlands
Koninklijke Luchtmacht (KLu)

Like Belgium, the Netherlands negotiated an agreement to build Hunters under licence. A brand new F.Mk 4 was delivered as a pattern aircraft, coded N-1, on 3 March 1955, and Fokker began production of the type immediately. The Dutch F.Mk 4s were serialled from N.101 to N.196, before production switched to the F.Mk 6. At least one F.Mk 4 (N-113) was used for radiation sampling, using a pod converted from a standard fuel tank. Dutch F.Mk 6s were serialled from N-201 to N-293. The single-seaters were augmented by 20 T.Mk 7s, 10 of which were built especially for Holland, but the rest were diverted from RAF contracts. Some Dutch F.Mk 6s were modified to carry AIM-9 Sidewinders under the outboard underwing stations.

The Dutch F.Mk 4s replaced Meteors in service, and served until 30 August 1963. The F.Mk 6s served from late 1957 until August 1968, when the last F.Mk 6s were finally replaced by Lockheed F-104Gs. The T.Mk 7s tended to serve with station flights, rather than with the front-line squadrons.

Netherlands' Hunters wore RAF-style camouflage, and later gained large white buzz-type serials on the nose. Squadron badges were carried on the tailfins. The T.Mk 7s originally wore an overall silver finish, with yellow T-bands, but were subsequently camouflaged. The traditional air force divided roundel insignia was carried in six positions (both sides of the fuselage and above and below each wing). White or coloured exercise bands were sometimes carried on the fin (chordwise), and around the rear fuselage.

No. 322 Squadron

No. 322 Squadron formed with Hunter F.Mk 4s at Soesterberg through the redesignation of No. 327 on 21 January 1958. It quickly re-equipped with F.Mk 6s. The squadron re-equipped with F.Mk 4s and in August 1960 moved (aboard the carrier *Karel Doorman*) from Soesterberg to Mokmer, a newly built airfield at Biak, Indonesia. The squadron was swelled by the addition of 12 F.Mk 6s in 1961, allowing detachments to form at Jefman and Utarom. The Netherlands was forced to cede its half of New Guinea to Indonesia in August 1962; No. 322 Squadron disbanded in October 1962, and the Hunters returned home. The squadron wore its traditional parrot badge on the tailfins of its Hunters.

No. 323 Squadron

No. 323 Squadron replaced its Meteor F.Mk 4s with Hunter F.Mk 4s at Leeuwarden in January 1958, but retained Meteor F.Mk 8s for target-towing until May 1959. From 28 July 1958, as the Meteors retired, some No. 323 Squadron Hunters were split off to form the Leeuwarden Vliegdienst Squadron, with appropriate target-towing modifications. They were reabsorbed in late 1959, although 10 (and eventually 12) aircraft again split off to form the Sleep en Instrument Vlucht, Leeuwarden for five months in early 1960. The main front-line element's F.Mk 4s were quickly replaced by F.Mk 6s, and the squadron evaluated the Sidewinder modification before flying its last Hunter sortie on 30 August 1963. No. 323 Squadron Hunters wore the traditional Diana badge on their tailfins.

No. 324 Squadron

The second Dutch Hunter squadron, No. 324, re-equipped with Hunter F.Mk 4s at Leeuwarden from April 1956. F.Mk 6s replaced the F.Mk 4s from October 1957, and the older Hunters were transferred to No. 322. The squadron disbanded in April 1964. The squadron badge was a white winged sword (point uppermost) on a red disc.

No. 325 Squadron

The Meteor F.Mk 8-equipped No. 325 Squadron at Leeuwarden received its first Hunter on 29 December 1955, and soon became operational as the first Dutch Hunter unit. F.Mk 4s gave way to F.Mk 6s in March 1958, when No. 325 transferred to join No. 322 at Soesterberg. The squadron finally disbanded in 1968. The squadron badge was a highly stylised black scorpion on a yellow disc.

No. 326 Squadron

In December 1957 No. 326 Squadron at Woensdrecht began to re-equip with Hunter F.Mk 4s released by the conversion of other units to the F.Mk 6. Meteors had entirely disappeared by the following March. The squadron transferred to Soesterberg on 1 August 1960 to replace No. 322 when the latter shipped to Indonesia, and disbanded on 17 December 1961. No. 326 Squadron's badge was a green snake's head, striking from a white cloud, on a blue disc.

No. 327 Squadron

No. 327 Squadron was the third Dutch Hunter squadron, trading in its Meteor F.Mk 4s for Hunter F.Mk 4s at Soesterberg in January 1957. The squadron disbanded to form No. 322 Squadron on 15 January 1958. The squadron badge was a golden bulldog in a red disc.

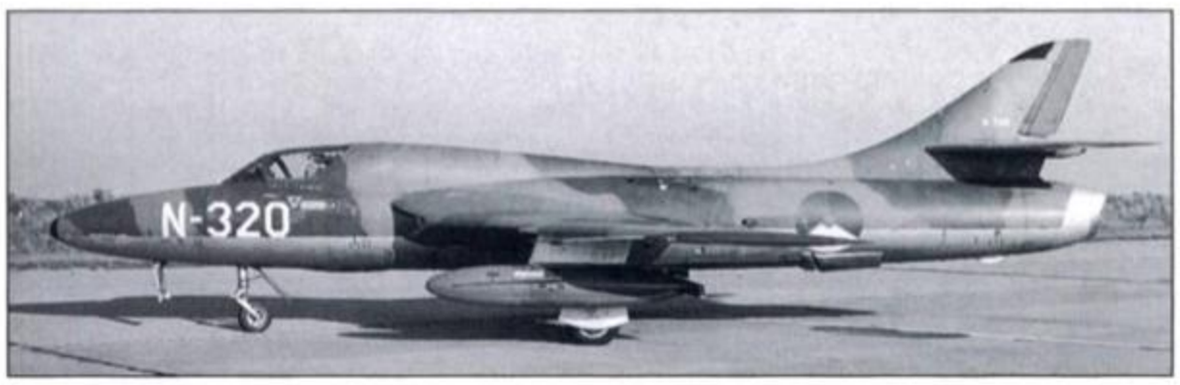
Leeuwarden Vliegdienst Squadron

This unit functioned as the KLu gunnery school, providing its own target facilities aircraft, and eventually had some 40 aircraft on strength. On 28 July 1958 Hunters began to replace target-towing Meteors with the Leeuwarden Vliegdienst Squadron (Leeuwarden Flying Services Squadron), and 20 were on charge by mid-October, eight modified for target towing. No. 323 Squadron reassumed responsibility for the target facilities role in late 1959, and reabsorbed the aircraft.

Sleep en Instrument Vlucht, Leeuwarden

Ten Hunter F.Mk 4s were transferred from No. 323 Squadron to form the Sleep en Instrument Vlucht, Leeuwarden (Towing and Instrument Flight, Leeuwarden) on 1 January 1960. Two more aircraft joined the flight in March, but in May it was disbanded and reabsorbed into No. 323 Squadron.

Above: This quartet of No. 325 Sqn F.Mk 6s was among the 93 built by Fokker-Aviolanda. Forty-six were sold back to HSA in the 1960s for refurbishment and resale. N-271 became F.Mk 56A A1011 with the IAF.



Below: Diverted from a cancelled RAF contract, T.Mk 7 N-320 was to have been XM126 and was completed to RAF standards, including the Avon 121 engine, a single gun and camouflage.

Below: Hunters occupy the flightline at a KLu air base shortly after delivery.

Oman
Sultan of Oman's Air Force

Oman's first Hunters were a number of RAF F.Mk 6s previously operated by Nos 8 and 208 Squadrons in Bahrain and Sharjah. An additional 31 ex-Jordanian aircraft (of Mks 10, 66, 67 and 73/73A/73B) were transferred in 1975. From these aircraft, Oman equipped a single 15-aircraft unit, No. 6 Squadron at Thumrait, with seconded RAF and contract pilots.

The Omani Hunters initially wore their original colour schemes, with Omani roundels applied to the rear fuselage and wings. The red-and-white Omani roundel received a green rim in 1970. The Hunters were later painted in a uniform desert camouflage. Some aircraft eventually received a variety of colour schemes, including a two-tone blue-grey wrap-round disruptive camouflage, and a pale air-superiority scheme. These modern colour schemes featured national insignia only in shield form on the tailfin, and Arabic serials on the rear fuselage. The shield-type insignia began replacing roundels in 1977, and from 1983 was applied in blue and white or blue and gold.

The SOAF Hunters were finally withdrawn in November 1993.

Sultan of Oman's Air Force F.Mk 6 724 (ex-RJAF 724), seen here in 1975, was among the handful obtained from Jordan. Most had been withdrawn for spares recovery by mid-1978.

Peru
Fuerza Aérea del Peru

Peru purchased 16 ex-RAF Hunter F.Mk 4s to augment its recently acquired (and heavily subsidised) Sabres. Serialled 630-645, the aircraft were officially designated as F.Mk 52s, though they were standard F.Mk 4s with the original two-pylon wing, most of which had not been delivered to a front-line RAF squadron. They were joined in March 1960 by the sole T.Mk 62, 681. The Hunters served with Escuadrón de Caza 14, within Grupo de Caza 12. Peru reportedly examined the possibility of purchasing F.Mk 6s in 1966, at the height of the great shortage of airframes for refurbishing and rebuilding. The F.Mk 52s were replaced by Mirage 5s in the interceptor role, and were switched to Escuadrón de Caza 12 for ground attack duties (despite their two-pylon wing) in 1968. They were finally replaced by Sukhoi Su-22s in 1976, but, even then, 10 surviving F.Mk 52s and the single two-seat aircraft served in the advanced training role, still with Grupo de Caza 12 at Limatambo, until eventually bowing out in 1980.

The Peruvian aircraft wore standard RAF-style camouflage, with large black serials on the sides of the rear fuselage. The red-and-white roundels (Peru's national insignia) were carried above the starboard and below the port wing, with the serial opposite. The whole of the upper fin was striped in red and white. Squadron insignia was later added to the sides of the nose.

In a break in the weather, FAP personnel pose with F.Mk 52 638 (ex-RAF F.Mk 4 WT734). Delivered to the RAF in 1955, the aircraft was returned to Hawker soon afterwards and redelivered to the FAP the following year.

Qatar
Qatar Emiri Air Force

Qatar followed Abu Dhabi's lead and ordered three Hunter FGA.Mk 78s (QA-10 to QA-12) and a single T.Mk 79 (QA-13) for delivery in 1969. One aircraft was lost in 1977. The aircraft were operated by the Qatar Public Safety Force from Doha by seconded RAF personnel and were eventually replaced by six Alpha Jets.

Qatari Hunters wore the same desert camouflage scheme as the Abu Dhabi, Kuwaiti and Saudi Hunters. The traditional air force roundel insignia was carried in six positions, with crossed national flags on a black rectangle serving as a fin flash.

Qatar's first Hunter FGA.Mk 78, QA10, was refurbished from Fokker-built KLu aircraft N-268. After retirement it was returned to the UK and preserved by the Yorkshire Air Museum, Elvington.

Rhodesia/Zimbabwe
(Royal) Rhodesian Air Force/ Air Force of Zimbabwe

The Royal Rhodesian Air Force received 12 Hunter FGA.Mk 9s (RRAF 116-127) in 1963 and used them to re-equip No. 1 Squadron at Thornhill. No. 1 Sqn's Vampires went to No. 2 Squadron, for advanced training.

Rhodesia unilaterally declared independence from Britain in 1965, before Britain could enforce a system of majority rule. The air force was then subject to rigorous sanctions, but they had little effect. The Hunters were reserialled in 1968 to complicate the task of enemy intelligence. The existing three-digit serials were converted to four-digit numbers through the addition of a 'floating 8' which moved one place to the right with each new serial – thus, 116, 117 and 118 became 8116, 1817 and 1188, respectively. Three Rhodesian Hunters – 1823, 1280 and 1821 – were lost in service in 1970, 1976 and 1979.

The Rhodesian Air Force dropped its Royal prefix in March 1970 and became the Air Force of Zimbabwe when Britain granted independence to the nominally democratic interim regime, on 18 April 1980.

The AFZ inherited the nine surviving Hunters (1188, 1198, 1258, 1284, 1286, 1817, 1827, 8116 and 8122) of No. 1 Squadron at Thornhill. The Air Force received four FGA.Mk 80s (1082, 1038, 1801 and 8100) and a single T.Mk 81 (1084) from Kenya in 1981. The AFZ's Hunter fleet was then devastated in a sabotage attack, which damaged beyond repair six FGA.Mk 9s (1188, 1198, 1286, 1827, 8116 and 8122) and three of the new FGA.Mk 80s (1038, 1082 and 8100). The British government supplied five FGA.Mk 9s in 1983, which became 1088, 1098, 1805, 1807 and 8106. Four more (1180, 1811, 1813 and 8112) were delivered in 1987.

In 2000, No. 1 Squadron is believed to retain six single-seaters and the sole T.Mk 81, though there appears to be some uncertainty as to their exact status; it is believed that these aircraft may be stored for use, with about five more single-seat Hunters, held in ready reserve. Zimbabwe's original FGA.Mk 9s initially wore an overall brown-and-green disruptive camouflage, but all surviving aircraft now wear RAF-pattern grey/green camouflage, with light grey undersides. National markings were restricted to a yellow Zimbabwe bird on each side of the tailfin. The 'last two' of the serial were applied to the fin and nosewheel door. The new multi-coloured roundel and fin flash introduced in 1994, which is carried by the air arm's Hawks and Chengdu F-7s, has not yet been seen on the Hunters.

Above: RRAF 116, Rhodesia's first Hunter, had served with No. 74(F) Sqn, RAF as an F.Mk 6. Becoming 8116 in 1968, it was written-off in the sabotage attack of July 1982.

Left: In the early 1970s, five years after the declaration of UDI, the 'Royal' prefix was dropped from the air force's title and this lion roundel was adopted by the RhAF.

AFZ Hunter FGA.Mk 9 '58' formates with one of the air arm's more recent acquisitions – a Chengdu F-7. One of the original batch of RRAF aircraft, Hunter '58' is actually serialled 125 – or '1258' in the AFZ serial system. In AFZ service the Hunters have been resprayed with dark green and dark earth upper surfaces, the latter being subsequently extended over the lower surfaces. Small national insignia and serials are also used.

Saudi Arabia

At Quwwat Al Jawwiya Al Malakiya As Sa'udiya (Royal Saudi Air Force)

Four refurbished Hunter F.Mk 6s (60-601 to 60-604) and two T.Mk 7s (70-616 and 70-617) were supplied as part of the air defence package under which Saudi Arabia also received Lightning interceptors and a variety of SAM systems. The Hunters were used to ease the transition of Saudi pilots from the Strikemaster to the Lightning, but were initially flown by seconded or contract pilots as interim fighters, pending the delivery of the Lightnings. One F.Mk 6 was lost in an accident in 1967, while the remaining three were passed to the Royal Jordanian Air Force in 1968. The T.Mk 7s (referred to by some sources, unofficially, as 'T.Mk 70s') remained in use alongside the Lightnings until 1974, when they were returned to the RAF (as XX466 and XX467).

The traditional air force roundel insignia was carried in six positions (both sides of the fuselage and above and below each wing), with the national flag serving as a fin flash. The flag is a green rectangle, with a white horizontal sword and the words "There is but one God, and Mohammed is his prophet" superimposed. Unlike the Saudi's US-built types, and the later Lightnings, the roundel was carried above the starboard wing, as well as the port. Serials were carried below the flag and on the nose in both Western and Arabic script, while Royal Saudi Air Force titles were similarly presented behind the roundel.

Hunter F.Mk 60 60-602 (former Mk 6 XF591) is seen prior to delivery as part of the 'Magic Carpet' arms deal with British suppliers, which included BAC Strikemasters and EE Lightnings.

Singapore

Republic of Singapore Air Force

The Republic of Singapore Air Force was formed with RAF assistance and naturally ordered Hunters as its first combat aircraft type. Some 12 FGA.Mk 74s and four FR.Mk 74As were delivered in 1970, allowing the formation of No. 140 Squadron at Tengah. Some Singaporean Hunters were briefly retained at Chivenor for the training of an initial cadre of pilots. Subsequently, the air force received 22 FR.Mk 74Bs, four T.Mk 75s and five T.Mk 75As (one ditched in the Bristol Channel before delivery), allowing the formation of No. 141 Squadron.

Singapore's Hunters were delivered in brown and two-tone olive drab/green camouflage, with white undersides. The aircraft wore their serials in white on the rear fuselage and had conventional red/white/red roundels in six positions, on the fuselage and above and below both wings. New national insignia were adopted in 1973, consisting of a red-and-white 'Ying and Yang' symbol and stylised 'S', and this was carried on the fuselage only, with no insignia on the wings. The new insignia was toned down in black (with the camouflage showing through the previous white areas) from 1986, and was replaced by the air force's current lion's head insignia from 7 November 1990.

RSAF Mk 74B 534 was photograhed in 1973, shortly after its delivery. Note the red/white roundels used at this time. Singapore's single-seat Hunters were completed to either Mk 9 or 10 standard.

No. 140 (Osprey) Squadron

No. 140 Squadron's aircraft wore a squadron badge on the tailfin. Red and blue interlocking triangles (red forward) were applied to the rudder. Some of the squadron's aircraft wore massive shark-mouths during the last months of Hunter operations. No. 140 Squadron re-equipped with F-16s in 1990.

This ferocious T.Mk 75A (532) was among the last Hunters in RSAF service in the early 1990s.

No. 141 (Merlin) Squadron

No. 141 Squadron's aircraft wore unit markings on the nose, consisting of a raptor's talons above the island of Singapore, flanked by rectangular black and red checks. Red and black checks were also often applied to the rudder. No. 141 Squadron at Paya Lebar operated a mix of FGA and FR aircraft, but had a primary tactical reconnaissance tasking. The unit began converting to RF-5Es from 1990, and had completely re-equipped by 1992.

Somalia

Dayuuradaha Xoogga Dalka Somaliyeed (Somalian Air Corps)

Somalia was a long-standing recipient of Soviet arms in a complex arms-for-bases agreement. The Treaty of Friendship was terminated in 1977 and assistance was then obtained from Italy, China and a number of friendly Arab states. Among these was Abu Dhabi, which transferred four Islanders and six Hunters in 1983, the latter comprising five FGA.Mk 76s and one T.Mk 77. Other sources suggest that the force received nine Hunters – seven FGA.Mk 76s, one FR.Mk 76A and a T.Mk 77. A single ex-Ethiopian Canberra defector and a number of Vampires were also noted (source unknown). Based at Berbera, alongside a unit of Shenyang F-6s, the Hunters were reportedly flown by South African and Rhodesian mercenaries, and maintained by contractors (reportedly Airwork). Law and order in Somalia collapsed in 1991, and the air force disintegrated. Derelict Hunters were left at Kisimayu and Berbera.

The Somali Hunters retained their Abu Dhabi desert camouflage, but had massive pale blue roundels and superimposed white stars on the fuselage and wings, and a rectangular blue fin flash, on which were superimposed a small white star in the top left corner and a broad blue stripe snaking from top right to bottom left. No Hunters survived to wear Somalia's new national marking of a white-rimmed green disc, with Arabic script in black on the white.

Sweden
(Kungl.) Svenska Flygvapnet

Sweden became the first export customer for the Hunter on 29 June 1954, ordering 120 F.Mk 4s (at a cost of £25 million) before the new variant had even flown. These aircraft were serialled from 34001 to 34120. Designated F.Mk 50, the Swedish variant (known locally as the J 34) made its maiden flight on 24 June 1955, although an RAF F.Mk 4 (WT770) was deployed to Sweden for familiarisation and evaluation in February. The F.Mk 50s initially lacked ammunition link collectors (which were retrofitted) and dogtooth wing leading edges (which were not). Swedish Hunters equipped F8 at Barkaby, F9 at Säve, F10 at Ängelholm, and F18 at Tullinge. In service, the Swedish Hunters were among the first to be modified to carry a pair of AIM-9 Sidewinders on new outboard underwing pylons. At least one Swedish Hunter was fitted with a Volvo Flygmotor afterburner system for trials. The type was withdrawn from use in 1966.

Swedish Hunters were painted with overall dark green topsides and light grey-blue undersides. Aircraft from F18's aerobatic team wore an 'Acro Hunters' logo in yellow on the nose. Swedish Hunters wore an individual letter code on the tailfin (in squadron colours) with the numerical wing designator on the rear fuselage. A five-digit serial was carried in tiny figures above the unit designator. F8 applied a yellow nose band, F10 a blue nose band.

As J34 'B' taxies to a stop, other F8 aircraft await refuelling on a damp day at Barkaby. Note the lack of yellow nose bands at this time.

Switzerland
Schweizer Flieger und Fliegerabwehrtruppen

After evaluating the F-86E and Folland Gnat, and being offered second-hand CS-102s (MiG-15s), the Swiss air force selected the Hunter as its preferred fighter-bomber; the type was finally ordered after the indigenous P-16 was abandoned in 1958. Switzerland received an initial 12 ex-RAF Hunter F.Mk 6s, followed by 88 F.Mk 58s newly built at Kingston. The aircraft featured the brake chute fitted to RAF T.Mk 7s and FGA.Mk 9s, and had extra ballast in the nose to allow the carriage of 400-kg (882-lb) bombs outboard. Delivered from 1959, the aircraft (J-4001 to J-4100) re-equipped the regular squadrons of the Uberwachungs-geschwader (Surveillance Wing), Nos 1 and 11 Squadrons, initially operating with conspicuous success in the interceptor role. Swiss squadrons are differently designated (as Fliegerstaffel or Escadrille) according to the part of the country in which they are based, and the ethnic origins of the pilots. In the air, the pilots use a fairly standardised language with words from German, French, Italian and English. From 1963, J-4001 to J-4055 were modernised with the fitting of AIM-9B Sidewinder AAMs, these later giving way to AIM-9Es. From 1960, later aircraft in the batch were assigned to the part-timers of Nos 5, 8 and 21 Squadrons. The aircraft were briefly augmented by a single T.Mk 66 trainer, Hawker Siddeley's demonstrator, G-APUX.

In 1970 Switzerland selected the A-7 as the replacement for its remaining Venoms, after evaluating the Saab 105, G-91Y, F-5A and A-4M. Dassault then offered the Milan, and a competitive evaluation between Corsair and Milan began. In the interim, Switzerland bought 30 reconditioned second-hand Hunter F.Mk 58As (J-4101 to J-4130, delivered in kit form) for assembly by F+W at Emmen. These aircraft actually cost more (in real terms, even allowing for inflation) than the original new-build Swiss Hunters, but still represented something of a bargain. When the Milan/Corsair evaluation ended (with the recommendation that 60 A-7Gs should be purchased, at a price of SFr1.5 billion), it was decided to order another 30 reconditioned Hunter F.Mk 58As instead!

The reconditioned single-seat aircraft (J-4131 to J-4152) were virtually identical to the original F.Mk 58s, but had the fractionally more powerful Avon 207 (rather than the 203), and lighter camouflage colours. The batch also included eight T.Mk 66 trainers (J-4201 to J-4208). The Swiss two-seaters were unique in featuring windscreen wipers, a modification designed to meet a specific request from the Swiss, who explained to the RAF's Hunter MoD desk officer that such equipment was needed because "Switzerland is the piss-pot of Europe".

The introduction of the reconditioned Hunters allowed the re-equipment of Nos 18 and 19 Squadrons, and later reconditioned aircraft went to re-equip Nos 4 and 7 Squadrons. The regular fighter units – Nos 11 and 18 Squadrons – re-equipped with Northrop F-5Es, allowing their surplus Hunters to pass to Nos 3, 6, 15 and 20 Squadrons. Introduction of the F-5E allowed the Hunter to relinquish the air defence role and assume ground attack duties from the Venom. Nos 3 and 15 were the last front-line Swiss squadrons to discard the ageing Venom, followed in 1983 by Nos 2 and 13, which were then operating in the OTU role.

The first major enhancement of the Hunter's operational capabilities came in the 1960s, with provision for AIM-9 Sidewinder AAMs on the F.Mk 58As, and with the installation of Saab BT-9K bombsights (as used on the Venom) on all front-line aircraft from 1974. Twelve aircraft (J-4101 to J-4112) were not modified with the new bombsight, instead becoming target-tugs. The Hunter's ground attack capabilities were further improved by the addition of extra rocket hardpoints, and with provision for BL755 (TABO) CBUs (on all aircraft) and AGM-65B Maverick missiles (on 40 aircraft, J-4056 to J-4100, excluding J-4069, 4071, 4079, 4084 and 4092, for Nos 2, 3, 7 and 15 Squadrons) in 1980-82. Aircraft also received Melpar AN/APR-9 RWRs and Tracor AN/ALE-39 chaff/flare dispensers. The original F.Mk 58s received Avon 207 engines.

The Swiss Hunter fleet stabilised as nine squadrons (Nos 2, 3, 4, 5, 7, 15, 20, 21 and 24) within 31 Brigade's No. 3 Regiment, though the pilot strength of these units was allowed to dwindle as the Cold War ended, and some units began to disband. There was felt to be no need to refurbish the F.Mk 58As, and 17 were scrapped in 1990, with 29 following in 1991. The reservist pilots were augmented by five full-time instructors for most of the Hunter's 'twilight years'. Five units (Nos 7, 15, 20, 21 and 24) were left by 1991, and these disbanded during 1994.

The Swiss aircraft wore standard RAF-type camouflage, with white serials on the rear fuselage and the 'last two' repeated on the nose. Some aircraft wore squadron badges, although the aircraft were generally pooled and allocated to the reserve squadrons for specific training periods, so an aircraft wearing a particular unit badge would be used by several squadrons during a single year. Towards the end of their service, some of the Swiss Hunters were painted in eye-catching special colour schemes to mark unit anniversaries and disbandments.

Above: These Hunter Mk 58s are from Fliegerstaffel 15, one of the last five Swiss Hunter squadrons.

Below: Hunter Mk 58A J-4129 is a Fliegerstaffel 1 aircraft, seen at Dübendorf in August 1985

Fliegerstaffel 1

Fliegerstaffel 1 was one of two permanently manned, full-time professional Hunter squadrons within the surveillance wing. The squadron's wartime base was Raron. Fliegerstaffel 1 finally re-equipped with F-5Es in 1983. Some of its Hunters have worn a stylised 'Roc' badge on their noses, sometimes in white over the camouflage, more recently toned down in black, and occasionally in black on a scarlet chevron.

2eme Escadrille

The Second Escadrille formed as a Hunter unit in 1983, and became one of four Hunter squadrons using the Maverick ASM. The squadron completed its last wartime course at Ulrichen in May 1990. Its wartime base thereafter was at Tourtemagne/ Turtmann. The squadron finally relinquished the Hunter in 1993. The badge of the 2eme Escadrille was a Gruyère crane in white on a red disc (sometimes in red on a white disc).

Fliegerstaffel 3

The squadron formed as a Hunter unit in 1980, and was one of four equipped with the Maverick. Its wartime base was Ambri, until disbanded in December 1992. Some squadron aircraft wore a stylised yellow swan on a yellow-edged blue disc.

Fliegerstaffel 4

Formed in 1975, with a wartime base at Turtmann, Fliegerstaffel 4 disbanded in December 1992. The unit badge consisted of a witch on a broomstick, superimposed on a four-leafed clover, in turn superimposed on a white disc.

5eme Escadrille

The Fifth Escadrille formed as a Hunter unit in 1959. The squadron flew its last sorties from Payerne in mid-December 1994. The unit's wartime base was Raron/Rarogne until late 1993, and then Interlaken. Its badge was a fire-breathing black dragon-cat's head, on a red-and-white disc.

6eme Escadrille

Formed as a Hunter unit in 1979, the Sixth Escadrille disappeared in 1984. Its wartime base was Sion. The squadron badge was a cartoon bird dressed in medieval uniform, carrying a pike.

Fliegerstaffel 7

Meiringen was this unit's war base from 1975 until 1983, then Interlaken until 1991. Ambri took over until the unit returned to Meiringen in 1994. The unit (one of only four armed with the Maverick) decorated one of its Hunters in overall blue upper surfaces, with yellow flashes on the rear fuselage and wingroots.

Fliegerstaffel 8

The unit's war base was at Meiringen from 1959 until 1975, then at Alpnach until 1984. The squadron badge consisted of a red swordfish swimming through a black number 8.

Fliegerstaffel 11

Meiringen served as this unit's war base from 1959 until 1975, followed by Alpnach until 1979. The squadron badge was a tiger's head, usually applied in yellow. One aircraft (J-4053) was painted in black-and-yellow tiger stripes for one day in May 1973.

Zielfliegerstaffel 12

Modified Hunters took over from ageing Vampire target-tugs in 1990, equipping Zielfliegerstaffel 12. The target-tug Hunters operated primarily from Meiringen.

Fliegerstaffel 15

The final Maverick-capable Hunter unit was Fliegerstaffel 15, whose war base was at St Stephan from 1980 until 1993, then at Meiringen until 1994. On the morning of 25 November 1994, Fliegerstaffel 15 flew a last five-aircraft formation over the Alps from its base at Meiringen. The squadron badge was a paper airplane on a blue disc. One of the unit's last aircraft (J-4040, painted as J-4015) was painted white overall, with 'Fliegerstaffel 15' repeated many times, together with the names of the unit's pilots.

Fliegerstaffel 18

Fliegerstaffel 18 was attached to the Permanent Wing at Payerne in 1973 to prepare for the introduction of Switzerland's new fighter, but did not convert to the F-5E until 1978. It had a wartime base of Alpnach until 1976. The unit's badge was a black panther on a green shield.

Fliegerstaffel 19

Formed in 1973, Fliegerstaffel 19 disbanded in 1979. The unit's war base was Alpnach, and some of its aircraft carried a stylised white swan on a red-edged blue disc.

Fliegerstaffel 20

Fliegerstaffel 20 re-equipped with Hunters in 1979. The unit's pilots flew their last sorties from Interlaken on 25 November 1994, having paid a farewell to their wartime base at Mollis in September. The squadron's badge was a black bison on a yellow disc.

Fliegerstaffel 21

The unit's war base was at Buochs from 1959 until 1967, then at Turtmann, and finally at Raron until 1993. The squadron badge was a gun-toting, stetson-wearing Happy Hamster character in white, riding a red shark, on a blue disc.

Fliegerstaffel 24

No. 24 Squadron was officially formed in 1984, but only gained permanent independent status (from No. 6 Squadron) in 1990. It had by then been operating for 11 years, having formed in 1979. The unit had a part-time ECM-training role, for which its two-seaters could carry a CFP76 pod under the starboard outer pylon. The pod contained 14 chaff magazines, and two IR flare housings. The aircraft also carried a VISTA IV jamming pod under the port outer pylon. The squadron lost its ECM pods in 1990 (replaced by PC-9s with Ericsson A-100 pods) but retained the chaff/flare dispensers. The last German-speaking Hunter pilots (including some from No. 24 Squadron) flew their final Hunter sorties on 16 December 1994, from Emmen. The unit's war base was initially at Sitten in 1979, then at Emmen, and finally at Payerne from 1980.

In the last days of the Hunter in Swiss service the six-ship 'Patrouille Suisse' was in demand for air show appearances in Europe. This view shows the colour scheme adopted after 1989.

'Patrouille Suisse'

The 'Patrouille Suisse' began in 1960 as a four-ship team, moving to five aircraft in 1970. Since 1978 the team has usually flown with a four-aircraft main formation and two solos. The team moved to Emmen upon the withdrawal of the Hunter from Dübendorf in 1992. The 'Patrouille Suisse' flew 350 displays in its 30-year Hunter era, without an accident. In doing so, it scooped two Shell trophies and a Diplôme d'Honneur from the International Aeronautical Federation. In later years (from 1989), the aircraft had striking red and white markings on their bellies, with the national insignia as a centrepiece. In 1991 the team's aircraft also wore the official logo of the 700th anniversary of the Swiss Confederation, and then finally received the legend '30 Jahre Patrouille Suisse' in yellow on the rear fuselage, with a big '30' on the fin.

Gruppe für RustungsDienste (GRD)

The 115th Flight Test Section of the GRD (Defence Technology and Procurement Agency) operated a single Hunter (J-4013), liberally bedecked with Dayglo and featuring a massive gentian on the belly.

Civil operators

Hawker Aircraft Ltd/Hawker Siddeley Aviation

Civil-registered, company-owned examples of Hawker's products are well-known and the firm soon saw the value in having a demonstration aircraft available for display before potential customers. Built as a private venture, the aircraft was seemingly put together as cheaply as possible. The resulting Hunter Mk 66A G-APUX was, therefore, something of a 'mongrel', constructed using the centre and rear fuselage of ex-Belgian Mk 6 IF-19, a front fuselage assembly from a ground display unit, the wings, fin and rudder of another Belgian aircraft (IF-67) and the engine of ex-RAF Mk 6 XE378. After an appearance at the 1959 Paris Air Show and numerous other display flights, 'APUX was leased in turn to the air forces of Iraq, Jordan and Lebanon for a total of three years before being refurbished as a T.Mk 72 for the Chilean air force.

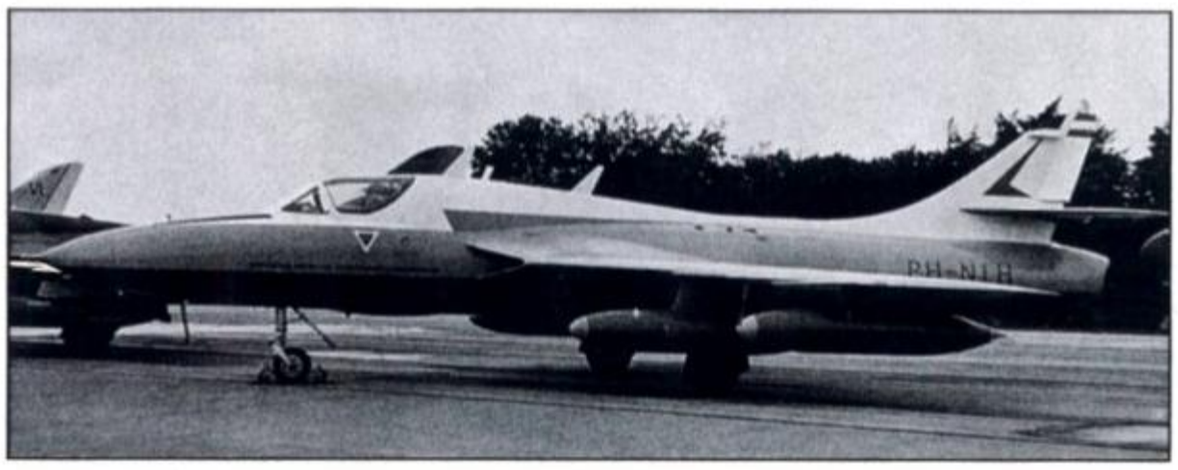
Prior to its delivery to the Singaporean air force, FR.Mk 74B 526 was registered G-BABM to fly at the 1972 SBAC air display. Finished in a two-tone desert colour scheme with blue undersides, the aircraft also carried the flags of the 18 countries that had ordered Hunters.

Above: G-APUX wore this striking red and white scheme during promotional displays at home and abroad. Twin 30-mm ADEN cannon, a UHF radio and the ability to carry 230-Imp gal (1046-litre) drop tanks were novel features.

FR.Mk 74B G-BABM was originally RAF F.Mk 6/FR.Mk 10 XF432.

Nationaal Lucht en Ruientevaartlaboratorium (NLR)

The Dutch equivalent of RAE Farnborough or Boscombe Down, the NLR (National Air and Aerospace Laboratory) flew Hunter T.Mk 7 PH-NLH (ex-RNethAF N-320) with various equipment fits, including a Bendix ADF set, a fin-tip trailing antenna and assorted underwing podded devices, the latter including a high-altitude nuclear sampler. Pictured below, 'NLH was finished in a white, orange and blue livery.



Ferranti Ltd

The Ferranti Flying Unit (FFU) at Turnhouse, the airborne proving unit for the company's Trials and Installation Unit (TID), worked in close collaboration with both the RRE and RAE. Among a varied collection of aircraft, the FFU operated Hunter F.Mk 4 WT736. A former Rolls-Royce trials machine, this was fitted with Ferranti's Pilot's Attack Sight (PAS) and flown between 1955 and 1958.

Martin-Baker Ltd

Martin-Baker ejection seats of one of three variants (Type 2H, 3H or 4H) were fitted to all Hunters. Trials of future production seats were carried out using the second prototype P.1101 XJ627. On loan from Hawker Siddeley, the aircraft was operated for 10 years from 1957 (after seven months at A&AEE), finished in a blue and white colour scheme with HSA logos.

Heavy Haulers

Fighting in the Korean peninsula required a massive air supply effort to keep the troops and combat wings supplied. The Douglas trio of C-47, C-54 and C-124, together with the Fairchild C-119 and Curtiss C-46, flew daily missions throughout the war. They brought in new personnel and equipment from Japan, and returned with damaged items for repair and wounded servicemen. Within Korea itself, the transports flew into harm's way to deliver supplies direct to the front line. On several occasions, mass paradrops were undertaken.

Above: Tachikawa in Japan was the focal point of most transport operations in the Far East. This 1953 scene includes a C-46, C-54s and C-124s. Within Korea, the Globemasters could only use the larger bases such as Kimpo and Suwon.

Below: With Navy F4Us in the background, a 6th TCS C-54 taxis in at Kimpo in September 1950, shortly after US Marines had recaptured the base and the city of Seoul.

Dawn at Tachikawa in the winter of 1950/51 – by this time the crews would have been briefed and the aircraft loaded for their flights to Korea. The Chinese were still rushing south at this point in the war, and every load was vital to the war effort.

Since as long ago as the Roman Empire, the most successful military campaigns have always been those with the most efficient logistical support. In order to wage war, an army must be able to feed and resupply its troops. The Korean War stressed this fact more than any other regional war, because almost everything had to be flown from Japan. During the first few weeks of the war, when the situation seemed hopeless, cargo aircraft flew hundreds of sorties into the crudest air strips imaginable. They performed numerous heroic feats during the 37 months of that war, and they have received very little recognition for it over the years.

In June 1950, the only air transport unit in the entire Far East was the 374th Troop Carrier Wing. It primarily flew C-54s, and, until this time, there was very little reason for the 374th to fly cargo to Korea from its home base at Tachikawa, Japan. The main traffic routes were from mainland Japan to Okinawa, ending in the Philippine Islands (Clark Air Base), where one of the wing's squadrons was based, the 21st TCS. The 374th kept the big air bases at Naha, Kadena and Clark supplied with whatever was needed. Occasionally, it had reason to fly into the Seoul area, but such excursions were few.

According to USAF records for 1949-50, only some 60 four-engined transports were present in the Far East; 90 days into the war, that number had increased to 250. The utilisation rate during this period rose from two and one-half hours to six hours per aircraft per day.

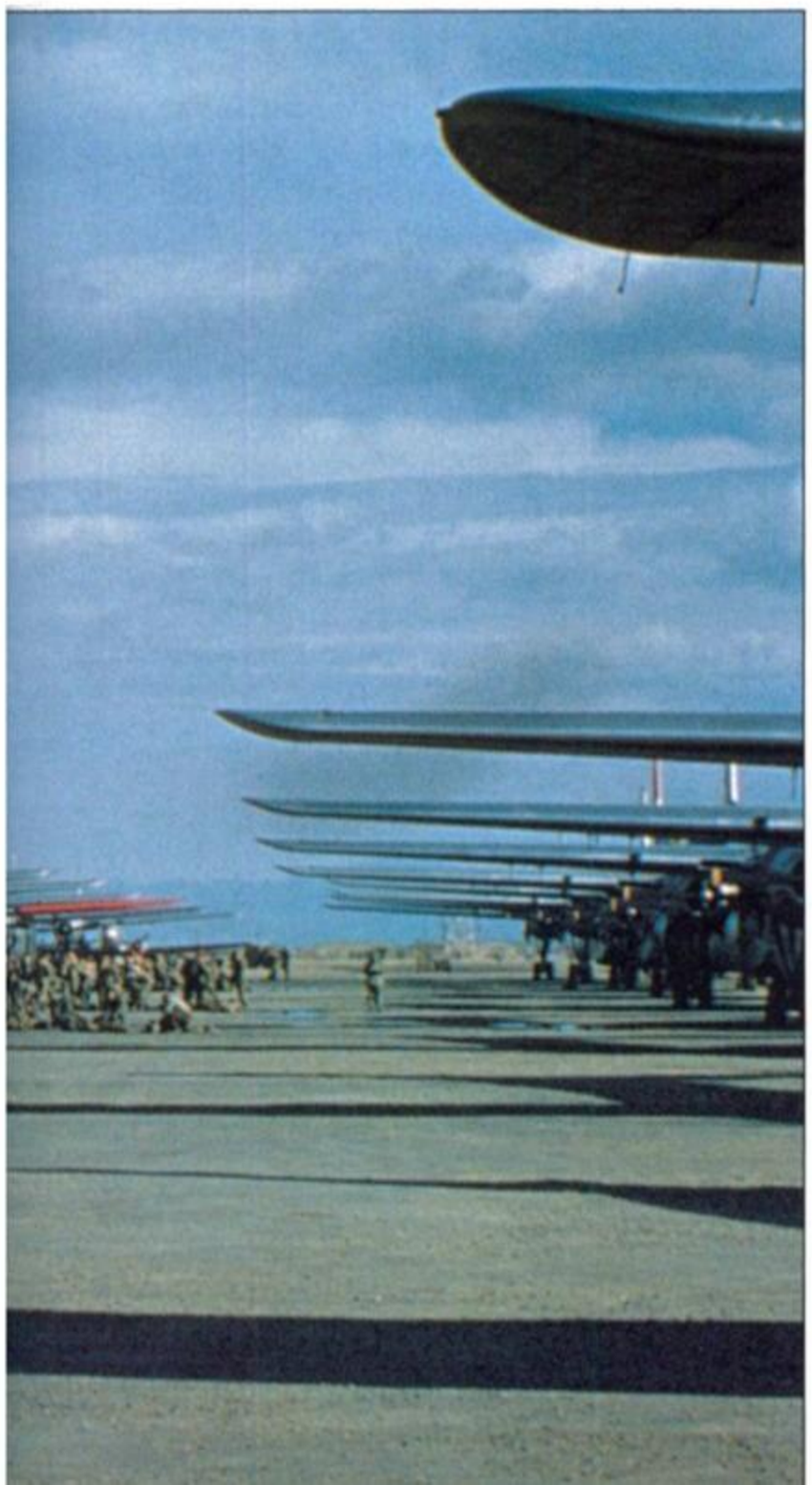
When the North Korean People's Army crossed the 38th Parallel on 25 June 1950, an emergency call went out to evacuate the large number of US civilians working in the Seoul area. This had to be accomplished in two days, and every C-54 in the Far East was summoned to assist. The area around Kimpo and Suwon ABs was swarming with North Korean fighters. The defending F-82s and F-80s had a field day, scoring numerous kills, but a few of the enemy aircraft broke through the protective barrier and were able to strafe the terminal area. One C-54, with mechanical problems, was caught on the ground at Suwon and destroyed. By 27 June, all of the civilians, missionaries and advisors had been successfully flown out or had sailed from Inchon Harbour on the Norwegian merchant ship *Reinholte*.

Early on, the 21st TCS was ordered to fly all of its C-54s to Japan and turn them over to the other two squadrons of the 374th Wing. All the available C-47s (a total of 11) scattered around several bases in Japan were rounded up, and came under control of the 21st Squadron. It took almost every flyable airframe of these two aircraft types to get the civilians out of Korea and to fly military cargo back into the forward areas, the latter being an almost impossible task. Knowing that large numbers of troops would have to be airlifted into South Korea, General Stratemeyer requested at least 15 more C-47s. His request for more C-54s was in the works, but would prove difficult to fill.

The Army moves in

The 24th Infantry Division, under General Dean, was finally ready to be airlifted into harm's way on 1 July, and an impressive fleet of C-46s, C-47s and C-54s was assembled. The North Korean armoured columns had rolled south for a week, almost unchecked. The weather did not co-operate, ceilings being very low around Pusan, which was to be the assembly point for American ground forces. It took until 4 July to complete the move for the 24th Division and, during the last day, the smaller cargo types had to finish the job because the C-54s could not safely manoeuvre below the cloud layer. The 24th Division gathered its equipment and began moving north. The men had no idea of what they were about to face.

The Stateside C-46s which had been requested did not materialise, but a large



Left: Paratroops assemble in their chalks before boarding waiting C-119s, those from the 61st TCS being seen at left. Seventy-five C-119s participated in the first big drop of the war at Sukchon and Sunchon.

Below: 314th TCG C-119C* The Wild Moose *is just one of dozens of transports assembled at Taegu. These were probably gathered to transport the 187th RCT paratroopers on the Munsan-ni paradrop.

Above: Wearing a 374th TCG badge on the fin, this C-47 served with the 21st TCS. It is seen at Taegu early in the war.

Below: By the start of the war Olive Drab C-47s were rare. This example is seen at Itazuke in mid-1950, having recently undergone a rudder change.

Above: Retaining their World War II Olive Drab paint, these C-46s are seen over Japan in 1946. The Commando was used widely in the Pacific theatre, being used to move men and supplies around bases in Japan.

number were rounded up from all over the Far East and converged on Tachikawa on 26 August. They formed two new squadrons, known as the 47th and 48th Troop Carrier Squadrons (Provisional). Cargo Command fully utilised these aircraft, even though their numbers were lower than other haulers in-theatre.

For the next 23 months, four cargo types were in-theatre and keeping them airborne pushed their maintenance crews to the limit. However, with the war only two weeks old, just three types were on the job.

Call-up for the 314th

In early August, the 314th Troop Carrier Group from Sewart AFB, Tennessee was notified that it would be called to Korea and would be bringing all 64 of its C-119s. These orders were cut at the same time as those for the 187th Regimental Combat Team from Camp Campbell, Kentucky. This highly mobile, crack paratroop outfit was to play a vital role in future events. There was one problem, though: the capacity of the 314th's aircraft on a single drop was 2,700 paratroopers, and the planners wanted to be able to put a minimum of 3,500 troops into the first major drop. The complement of 314th C-119s was augmented to 96, but organising such a massive move meant that the 187th did not touch Korean soil until 21 September. Unfortunately, this was one week after the Inchon landings.

During those bleak days of August, the 21st Squadron's C-47s flew low over the fluid front lines and para-dropped supplies to the US and RoK troops trying to preserve the perimeter. These twin-engined cargo haulers flew such missions from Ashiya AB, and the squadron put up so many flights each day that they acquired the nickname of 'Kyushu Gypsies', which stuck for the duration of the war. The aircraft absorbed a lot of ground fire during their low-level approaches, sniper fire being particularly heavy at both Pusan and Pohang. In bad weather, the low-level drops were even more hazardous because of the mountainous terrain, not only in southern Korea but also in Japan. The mountains were almost 13,000 ft (3962 m) high in Japan and 7,500 ft (2286 m) in Korea. Dropping down to acquire visuals on the areas to receive the pallets took the aircraft well below 7,500 ft.

Numerous accidents occurred on the runway at Pusan, most due to various pieces of equipment being on the runway, rather than bad weather. This particular runway was literally beaten to a pulp from the heavy usage. Stationed along the runways were a large inventory of road graders, bulldozers, etc., which C-47s often had to avoid on the way in; the resulting manoeuvres were known to cause the aircraft to go out of control and crash. Repairs being made at one end of the runway were responsible for at least two instances when pilots said they had to land and come to a stop in 1,200 ft (366 m). To make matters worse, most of these stretches consisted of pressed gravel.

By the third week of August, it became apparent that the troop carrier units controlled by 5th AF would be unable to handle the escalating workload, especially since they were a secondary arm that ranked behind fighters,

The RAAF used Dakotas throughout the conflict, chiefly on the supply run between the main base at Iwakuni (where this aircraft is seen in 1950) and the front-line bases. The aircraft was detached from No. 86 Wing, assigned to No. 30 (Communications) Unit, itself parented by No. 91 Wing.

Above: Although C-46s, C-47s and C-54s played an enormous part in the transport effort, it is the Fairchild C-119C that is most associated with the war in Korea. The 'Dollar Nineteen' was widely used on all forms of transport duties, but specialised in air-drop operations.

Right: Between 12 and 17 December 1950 US transports kept up a concentrated evacuation from Yonpo, aircraft leaving at the rate of one every three minutes. Notable in this view is the US Marine Corps R5D.

bombers and fighter-bombers in priority. At this time, two major adjustments were made that would have an impact on the haulers for the remainder of the war. First was the formation of Combat Cargo Command (Provisional), referred to as CCC(P). It would answer only to Far East Air Forces and would have complete control over the 374th Troop Carrier Wing, the newly arrived 314th TCG and the 1st Provisional TC Group. Second, Lieutenant General William H. Tunner was chosen to head the new CCC(P). No one in the USAF had his expertise or knowledge of moving supplies and equipment: he had been the director of 'Hump Operations' in the CBI and had made the decisions governing the recent Berlin Airlift. This combination would prove to be a major asset to the war effort in Korea. Tunner was brought in to help win the war, and not just to help solve the Pusan Perimeter problem.

The 314th enters the fray

At the same time General Tunner arrived, so did the 314th Troop Carrier Group from Sewart AFB, Tennessee. Its sole initial purpose was to support the 187th Regimental Combat Team, a paratroop unit formed from the 11th Airborne Division. The group's C-119 Flying Boxcars made an important contribution to the early stages of the war. They were immediately put to work flying full loads of ammunition, gasoline, rations, trucks, steamrollers, etc. into the shrinking perimeter. These aircraft were very versatile and could operate on the battered and abused runways that characterised Pusan's facilities. They were well into their routines when Combat Cargo Command was officially organised on 10 September 1950.

The floodgates opened once the Marines overran the North Korean defence around Kimpo and Seoul. The rout of the invading army had reached epidemic proportions. Now, the number of operational airfields was increasing at a pace that made it almost impossible to supply the UN forces as they marched north. The first cargo aircraft to land at Kimpo, with Seoul not yet secure, were C-119s loaded to capacity with ammunition and sorely needed equipment. A huge amount of equipment had built up in Japan which could not be delivered to Korea because of doubts regarding the security of Pusan. Therefore, it all had to be delivered to the ground troops within a few days to make sure they had what was needed to push the enemy beyond the 38th Parallel.

The job of carrying out the wounded required an aircraft able to move into areas that had just been secured. C-46s, which could carry more litters than C-47s, were drafted into this role.

After Seoul had been secured, the main job of the 314th Group and its C-119s was to bring the 187th from Japan, which was accomplished in two days. Once this was complete, the group was tasked with resupply of the escalating fighter-bomber operations, a staggering job. The F-51 Mustangs, B-26 Invaders and F-80s had consumed all available ordnance. The burden fell to the C-119s, which brought in gasoline, bombs, rockets and the tanks that would be filled with a deadly mixture known as napalm. These items arrived at Pusan by ship, but the front lines had shifted almost to the 38th Parallel, which meant they had to be flown the rest of the way.

Above: Photographed at Taegu (K-2), this is the instrument panel of a C-119. It is dominated by engine instruments and controls.

Below: While Japanese workers busy themselves with straw mats which will be placed over newly-laid runways, a 437th TCW C-46 comes in to land at the end of another return trip to Korea. The base is Brady AB, one of many Japanese locations used during the Korea supply effort.

Skymaster pilot

Lieutenant Ernie Banks, 6th Troop Carrier Squadron

"My first mission into Korea, on 16 December 1950, was an eye-opener! At the time, I had not yet been checked out as an Aircraft Commander (AC), so I was riding co-pilot. We flew from Tachikawa to Pusan. From there we were directed to fly directly into Hungnam, North Korea. We were carrying a load of 'C' rations. Once we landed, they unloaded the aircraft, placed all the 'C' rations into a huge pile and set them on fire.

"There was a major artillery battle raging close by, as the Chinese were coming down in large numbers. The runway at Hungnam runs from the waterfront inland towards the foothills to the west. I got out of the aircraft to check it out and found that the firing was coming from a semi-circle of tanks that had formed up around the western end of the airfield [2 miles/3.20 km distant]. They were shooting into the hills. Evidently our guys were hanging tough, because they did not officially abandon the strip until 23 December.

"Once our C-54 was empty, they began loading 250-lb bombs on the floor of the aircraft. They were tying them down with straps and, once the floor was completely covered, they tossed the tail fins in the back behind the bombs. We had to walk over the bombs to get up to the crew compartment.

"I well remember that particular take-off. We were about No. 20 in line for the main runway. We finally took off to the west, toward where the battle was raging. Just as soon as we got off the ground, with wheels coming up, the pilot put our C-54 into a very steep left turn to keep us from flying over the battle area. We turned out to sea and headed for Taegu, where they were desperate for the bombs we were hauling. The rest of the day was uneventful. In the nine months I spent in-theatre, that was my most exciting mission.

"When we left Tachikawa, we had no maintenance available to us. We depended on our crew chief and his bag of tools. We always took a spare wheel with us when we left Japan, because of the odds of blowing a tyre. One of our ground crewmen came up with a brilliant idea for jacking up the aircraft. They took about 10 2x4 pieces of wood [i.e., 2 in x 4 in/ 5 cm x 20 cm] about 5 ft [1.50 m] long. They were tapered to where they would form a perfect ramp. We then put this under the good tyre, started up two of the engines and taxied up on the ramp. It left the blown tyre off the ground, so it was easy to change.

"Another problem we encountered were burned-out starters. To solve this problem, we used the 'buddy system'. We would get another C-54 to taxi up right in front of the dead engine and align one of his good engines with the bad one of ours. He would start his engine and rev it up and the force [of the air] of the propeller would windmill the bad engine's prop until it kicked over. The aircraft in front would taxi away and we would start the remaining three engines and take off. If we were scheduled to make other stops, in Korea, we would leave the bad engine idling until we were loaded. The starter would be changed out once we got back to our base in Japan."

The C-54 could carry an impressive load of 55-US gal fuel drums, vital for the fighter-bomber units at forward bases. The standard offload technique was to place old tyres under the cargo door and push the drums out before rolling them away.

A C-54 of the 6th TCS – the 'Bully Beef' squadron – nuzzles up to another Skymaster for the journey from Tachikawa to Korea. The aircraft displays a recently fitted rudder.

Above: Lts Ernie Banks (left) and Dave Tilton relax while their C-54 is offloaded at Chinhae (K-10) in late 1951.

Right: 6th TCS crews relax outside their ops building at Tachikawa. During the early months of the war they had flown double shifts.

Although the C-119 and C-124 were much better suited to carrying vehicles, the C-54 could also carry Jeeps and the like. This Jeep has been backed up the ramp under its own power. Judging by the front wheel, there was little margin for error in this process.

Above: A pair of 21st TCS C-47s has found a quiet place to park, next to the ruined old terminal building at Kimpo. The date was November 1950, and in a matter of weeks the Chinese army would be sweeping through.

Right: Korean workers continue construction while C-54 operations roll on.

Below: A vital role for the C-54s, especially, was medical evacuation. Here a stretcher case is wheeled into a C-54D at Taegu for the flight back to hospital in Japan.

On 20 October the 314th finally got to exercise its ability to transport and drop airborne assault troops. The mission, developed by General MacArthur's planning team, was to be executed in one day. Since the 187th had arrived too late for the Inchon landings, it would be used to secure the North Korean rail and communication centres at Sukchon and Sunchon. This act would also cut off the North Korean troops who were retreating north. General Tunner handled the details of the air operation, ordering 87 C-119s and 40 C-47s. This was the minimum number of aircraft needed to put all of the 187th's troops on the ground in one day. To ensure there would be no setbacks due to mechanical problems, Tunner ordered that the designated aircraft stand down from daily operations two days before the drop, allowing valuable time to fine-tune the assets.

Successful drop

The operation was a great success. Only 75 C-119s were used for troops, the remainder carrying valuable equipment. In very little time, 3,000 paratroopers had been dropped along with 300 tons of vehicles, ammunition, weapons and supplies. Some 6,000 North Korean troops threw up fierce but brief resistance. During the drop, one paratrooper was killed and 39 were injured. On the second day of the operation, another 1,000 troops were dropped into the main zone. As the third day ended, the scope of the 187th's accomplishment became clearer. They had fought and killed 2,800 North Korean regulars, and captured over 3,000. While these figures are impressive, the real highlight of the operation was the interception of a train load of American prisoners headed for POW camps, probably in Manchuria. Unfortunately, 57 of these prisoners had been slain the night before when the train was hidden in a tunnel.

Korean air bases rapidly became littered with the hulks of aircraft which hadn't quite made it. Many of these fields were surrounded by hills and landing in bad weather was hazradous. This C-46 is at Kimpo, having been abandoned after all useful parts had been stripped.

In the meantime, the entire complement of C-54s in-theatre assumed the regular taskings until the drop had been completed and the 127 transports could be put back in regular rotation.

As the front shifted ever farther north, engineers worked miracles on the airfields at Suwon, Kimpo and Taegu. The immediate improvements made it easier for the big C-54s to use these bases more frequently, especially during periods of rain and mud. The damage done to the PSP, however, made it difficult to keep up with repairs. Replacement sections were becoming scarce and almost everything being used came from stockpiles left from World War II.

The plan for CCC was simple, yet difficult to implement due to the vast area that had to be covered on a daily basis. The front lines now stretched all the way to the Manchurian border. The roads and rail network north of the 38th Parallel was in pitiful condition, having been subjected to UN air strikes for the past three months. Therefore, the only way to effectively supply the troops was from the air. The airfields in North Korea had suffered the same fate, but had not been the object of daily bombings, as the former had. Once the NKAF had been neutralised, the attacks against these targets subsided to a degree.

In mountainous and wooded terrain such as this, air drops were the most efficient way of keeping ground forces supplied, and the C-119C was the vehicle of choice. These supplies are seen being dropped in 1952 to UN troops holding the high ground against a Chinese attack.

Above: Having arrived too late to participate in the Inchon landings, the airborne force was given its first opportunity to influence the war on 20 October 1950 during the landings at Sukchon and Sunchon. This is a 61st TCS C-119 dropping troops during the operation.

Right: With another C-119 orbiting in the background, **Hot to Trot** *delivers much needed fuel and supplies to beleagured UN troops fighting in the snowy wastes of Chungju.*

As late November rolled around, the Korean conflict, or 'police action', evolved into a full-scale, drawn-out war with the entry of the Chinese military.

By December, the UN retreat had begun and the US Marines were about to fight their way out of a massive trap that involved over 80,000 enemy troops. The Chosin Reservoir was to be one of the most heroic battles ever fought by the Corps. This grim situation also led to one of the finest performances by C-47s and C-119s, under the worst conditions imaginable. The bitter winter of 1950/51 set in and there was almost no way to relieve the UN forces.

During December, the airdrops in support of X Corps and the Marines reached 250 tons (246 tonnes) per day, and this amount was just to keep these forces fed and capable of offering the minimum of resistance. The southward movement of X Corps was satisfactory, but the Marines were caught in an entirely different situation. On 5 December, General Tunner flew into the crude field at Hagaru-ri and decided that his C-47s would fly out every Marine fighting in the Chosin Reservoir withdrawal. However, there was a catch to this plan, in that it could only be done if all their equipment was left behind. Marine General Oliver P. Smith immediately stated that he would prefer for his troops to fight their way out if CCC could continue its airdrops. Not only were the C-119s able to make the drops, but a small number of C-47s was able to land on the roads and crude strips nearby. This kept a continuous shuttle of wounded Marines moving out to safety.

Chosin break-out

After 13 days of fierce fighting and isolation, the Marines broke out of the Chosin bottle-neck. At the same time, the remnants of the US 24th Infantry Division made their way through the Chinese road blocks and ambushes. Most of the equipment also made it out. Statistics from both the Marines and 5th AF showed that 313 C-119s and 37 C-47s had dropped 1,580.3 tons (1555 tonnes) of supplies during that brief period, the majority in just seven days. However, the troops were not able to use it all because of the damage caused when the pallets hit the frozen ground. All these missions were flown at very low altitude, with the Chinese putting up an intense curtain of small arms fire against every aircraft. It was sheer luck that no transports were lost.

With the landing area in Hungnam-Hamhung overrun by Chinese, final operations of this mass evacuation were flown from Yonpo Airfield. It took 391 sorties from this field to evacuate 228 wounded, 3,891 passengers and 2,100 tons (2066 tonnes) of cargo. Four C-119s were down due to mechanical problems, which created a dilemma as enemy troops rapidly closed. Spare parts were airlifted from Tachikawa and emergency maintenance was performed in an effort to get these Flying Boxcars airborne long enough to reach a safe base. Three made it, but the fourth had to be destroyed on the ground. It was the only cargo

Fairchild's C-119 Flying Boxcar was, in many respects, the first successful modern transport. It drew on the Gotha Go 242/244 layout which kept the cabin floor height close to the ground. For air drop operations C-119s often flew with the rear clamshell doors removed.

187th RCT paratroops drop over North Korea in 1951. The C-46 partnered the C-119 on the airdrop mission, being used more for troop deployment. The C-119's gaping rear door was better suited for supply and equipment drops.

type lost in the withdrawal.

Lieutenant Ernie Banks, a C-54 pilot in the 6th Troop Carrier Squadron, recalls the condition of some of the runways into which he flew after the Chinese had entered the war. "The runway conditions in Korea were pretty sad. Hungnam, Kimpo and Pusan were paved, but the rest were beat up from the constant wear and tear. I believe the base at Chinhae was also paved, but there was very little reason to fly into it and the runway was so short that it was

To war in the Commando

Lieutenant Spencer Grant, pilot, 437th Troop Carrier Wing

"Right after the Korean War started, the C-46s were hastily taken out of mothballs and some were bought back from private owners. These aircraft were literally kept busy day and night. I flew over 1,200 hours in 12 months and these were mostly short flights. We hauled supplies and personnel from coastal ports and Japan to landing strips all over the Korean Peninsula. We dropped supplies by parachute near the front and also flew air-evac for casualties coming from the front. We also participated in a few troop drops. Some of the airfields we flew into were dangerous due to the terrain and weather conditions.

"The only thing we had for instrument approaches in Korea was low-powered directional beacons. There was a published instrument approach for each one. It consisted of tracking outbound on a bearing for three minutes, making a procedure turn and tracking back into the homer while you let down between the mountains. The problem here was that when you get three minutes from these homers, the bearing is very unreliable and letting down on this tends to be suicidal! This is particularly true in any kind of weather. My procedure was to come over the homer high enough to clear all the mountains, drop the gear and flaps, tracking out about 20 to 30 seconds, descending at about 5,000 ft [1524 m] per minute, making a procedure turn and coming right back over the homer, descending into the field.

"This worked very well, but as you can well imagine, some people became a little nervous with this emergency type descent. On my first instrument approach with a Civil Air Transport (CAT) crew onboard, I was afraid this would be the case. I explained what I was going to do and told them that we had lost some crews in trying to do the published approach. I came over the homer and called for gear and flaps down. The co-pilot just sat there and did not comply. I commanded again and this time the captain who was riding on the jump seat told him to do it. We eased in with no further problems, and it made believers of those on the aircraft. No doubt about it, when the weather didn't co-operate, most of the air bases in South Korea were extremely dangerous to fly into.

"Finishing up, I must put in a word of praise for the ol' C-46! It was one rugged airplane. We had minimum maintenance. There would be page after page of components that were overdue replacement. Still, they operated almost flawlessly. The P&W R-2800 engines may well be the best reciprocating engine ever built. In my opinion, the C-47 always got top billing but the C-46 was twice the aircraft. It carries twice the load and performs much better. At 48,000 lb [21773 kg] gross, the C-46 had fair single-engined performance. At 55,000 lb [24948 kg], you had better find a place to land ... straight ahead! The Curtiss Electric prop had a bad name. Given a choice, I guess I would have taken a Hamilton Standard, but the Electric was OK. Even the dreaded runaway prop was not that serious as long as the low pitch stop was in place. You could still get enough power out of it, without exceeding 2,800 rpm, to keep flying!"

Right: Lieutenant Spencer Grant occupies the right-hand seat of a C-46 while giving a check ride to a newly-arrived pilot from the States. Note the huge steering yoke.

Right: A few C-46s were given the task of 'de-lousing' UN air bases. They were fitted with spray gear under the tailplane and used to shower DDT over the bases and immediate surrounding areas to combat the mosquito problem. This aircraft is seen at the new base at Osan (K-55) in 1953.

Below: 187th Regimental Combat Team paratroops tumble from their 437th TCW war-wagons during a training exercise over Korea. Shortly after, US paratroops would drop from 80 C-119s and 55 C-46s in a less than satisfactory assault on Munsan-ni.

Many of the forward airstrips in Korea were rough and short, and only the wartime veteran C-46 and C-47 could make it in. Either type could operate in conditions and from strips denied to the C-54 and C-119. Snow added another hazard to the many faced by the transport crews, but did not stop the airlift effort.

Above: A C-119 basks in the bright sunshine at Suwon (K-13). The aircraft wears the famous markings of the 61st TCS 'Green Hornets' of the 314th TCG.

Right: Someone's loss is often another's gain – this wrecked C-119 was imaginatively pressed into use by the 35th FIG as a snack bar, with kitchen, seats and tables inside.

Below: A weakness of the C-119 was the inability of the slender tailbooms to withstand a hard landing, as graphically displayed by this aircraft at Taegu in October 1950.

dangerous. [A few months later, Chinhae (K-10) became the main base for the 18th Wing's Mustangs, so the cargo traffic picked up considerably.] Taegu was the most frequent base that I flew into. During the spring rains, the soft ground under the PSP caused it to buckle when the big planes landed. Many times, I had been on the ground and watched the heavier aircraft land, under those conditions, and as they touched down they would push a huge ripple of PSP ahead of the main gear, rising about a foot off the ground. They were literally pushing the runway from one end to the other with each landing! The jagged ends of the PSP that had become unjointed were the major cause of the blown tyres."

By 25 January 1951, the stream of cargo organisations that had been rushed from the US slowed to a trickle. The newly reactivated 315th Air Division under General William H. Tunner assumed command over Colonel Troy Crawford's 374th Troop Carrier Wing (two squadrons of C-54s at Tachikawa), Colonel Frank Norwood's 61st Troop Carrier Group (three squadrons of C-54s at Ashiya), Colonel John Roche's 437th Troop Carrier Wing (four squadrons of C-46s at Brady AFB, Japan), Colonel Richard Henderson's 314th Troop Carrier Group (four squadrons of C-119s at Ashiya) and the 21st Squadron which had been operating C-47s from Itazuke AB. This streamlined the air freight operations and they became even more effective. The hectic days of major advances and retreats had just about ceased, allowing the major haulers to perfect their operations, which ran relatively smoothly for the remaining 30 months of the war. The only development to cause any concern would be the introduction of the massive new C-124 Globemaster into the war, but that would come later.

From about May 1951 until the war ended in July 1953, a constant stream of transports hawked their services between Japan and South Korea. The strategies of both sides were obvious and never wavered during this period.

The Chinese had to find a way to bring enough supplies to their troops to be able to mount effective offensives that would drive the UN forces well below the 38th Parallel. They had to do it on the ground – there was no way it could be done by air – and it had to be at night. They did not succeed because of the aggressive nature of the American night interdiction operations, flown mainly by B-26s, F7F-3Ns and F4U-5Ns.

By contrast, the UN forces had a vast array of transport types flown by very experienced aircrews, and could be supplied by all three modes: air, ground and sea. They had to maintain a certain level of equipment, ammunition and food to be able to repel any attacks from Communist forces, which always held a distinct advantage in manpower. The greatest advantage the UN troops had over their enemy was the rapid removal of wounded from the front, back to Japan and its superior medical facilities. Thousands of lives were saved by the C-54s and C-47s after heavy fighting had taken place.

'Angels of mercy'

The 'ground-pounders' still remember the close air support given to them by the fighter-bombers, and they still hear the welcome whine of a forward air controller coming to their aid. At a mention of the big 'angels of mercy', though, they become emotional, especially when it meant the difference between life and death to them or their buddies.

Fuel was the most precious commodity to the fighter-bombers trying to slow the Chinese advance. Most of it had to be flown from Japan in 55-US gal (208-litre) drums, delivered to the forward bases at Taegu, Suwon and Kimpo. With the steady flow of C-54s, the Mobile Army Surgical Hospitals were able to stabilise most of the wounded long enough to get them down to these three bases for transport back to hospitals in Japan. This meant that these transports had to unload as quickly as possible – and the huge, heavy drums were difficult to offload. The solution was to place several old tyres below the main door: the drums were rolled off, landing undamaged on the tyres. Several ground crewmen then rolled them out of the way while other drums were dropped off. This process cut the unloading time by at least 75 per cent, freeing the aircraft to load the litters and be off the ground much sooner.

For people in the forward area, the most memorable hauler was probably the C-47. It could make it into the crudest strips under the worst conditions. Unlike other types, its operations were less governed by the length of a runway or whether it was paved.

It would probably go without saying that the squadron with the highest profile in the forward areas was the 21st Troop Carrier Squadron, 'Kyushu Gypsies'. These C-47 crews carried more illustrious passengers than any other squadron, for which they had an aircraft with a plusher interior. This single aircraft carried more politicians, movie stars, entertainers, and high ranking officers from the Pentagon than any other type in the history of the USAF.

As well as its normal cargo/trooping work, the C-54 was widely used as a staff and VIP transport. This smartly painted machine was operated by 5th Air Force Headquarters, and is seen here at Kimpo (K-14).

C-119 nose art

Of all the types serving in Korea, only the B-29 bomber could rival the 'Dollar Nineteen' for the quality and quantity of its nose art. These are just a handful of examples.

Right: **Kimpo Kat** *was typical of 61st TCS aircraft, and was photographed during the Sukchon paradrop on 20 October 1950.*

Below: Squadron commander Lt Col Wayne Matson stands by 50th TCS C-119 **Marathon Monster.**

Below: **Jo-Jo** *of the 61st TCS is liberally adorned with mission marks. The large parachute indicated the large Sukchon jump.*

Above: **Skivy Girl** *at Osan, 1953.*

Left: 51-2572, 63rd TCS, 403rd TCG.

Far left: **Carolina Baby,** *314th TCG.*

Under General Walton Walker and General Matthew Ridgway's command, the name *Nikh* (Greek for victory) was painted on the nose. When General Van Fleet took over the 8th Army in Korea, he renamed the aircraft *Sungni* – Korean for victory. Bob Hope and his entertaining group made numerous flights in it, as did Marilyn Monroe, Cardinal Spellman and South Korean President Syngman Rhee.

On 21 March 1951, the 187th Regimental Combat Team was dropped into a hostile environment once again. The drop zone was at Munsan-ni, where Intelligence had confirmed information that 12,000 North Korean regulars were in the area. CCC brought in 80 C-119s from the 314th TCG and 55 C-46s from the 437th TCG for this operation, which was launched from Taegu AB.

Before the day was over, the C-119s had dropped 2,011 paratroopers and 204 tons (207 tonnes) of equipment and supplies. Forty-eight C-46s unloaded 1,436 troopers and 15.50 tons (15.25 tonnes) of equipment, in the face of a moderate amount of ground fire. Five aircraft were hit. One burst into flames several minutes after making its drop: most of the crew bailed out safely, but the pilot and co-pilot were killed when the aircraft exploded in mid-air. C-119s usually maintained an altitude of about

Combat Cargo's biggest hub was at Tachikawa, this scene in 1951 showing C-46s (including Olive Drab aircraft), C-47s, C-54s and a single B-26 on the ramp. The following year the C-124 Globemaster made its impressive size felt at the base.

Transports from outside the Combat Cargo organisation were also regularly seen in Korea. This MATS Lockheed C-121A Constellation was visiting Pusan West (K-9 – better known as the 'Dogpatch') in 1950.

800 ft (244 m) during a drop, which certainly put them in harm's way! The results of the operation were less than satisfactory, as the North Koreans had heard of the drop and only about 200 enemy troops were killed in the fight.

During the course of the war, several new aircraft types made their combat debut, such as the F-84, F-86, F-94 and RB-45. From the onset, the four mainstay cargo carriers had been the C-46, C-47, C-119 and C-54. In the US, a new monster of an aircraft was establishing itself as the heavyweight contender for the title of largest aircraft in the USAF inventory. This was the C-124 Globemaster. Once the main line of resistance had stabilised (spring 1951) and the engineers finally had the breathing room to make improvements to the runways at some of the major bases, it was just a matter of time before this new super transporter would ease its way into the war effort.

As the volatility of the war eased somewhat after the commencement of peace talks, the pace of the transports slowed to a degree, but the reduced demand did not affect the impressive statistics that CCC was compiling. Between 1 July 1951 and 30 June 1952, the Pacific Division of Military Air Transport Service hauled 16,766 tons (16497 tonnes) of cargo and mail. It also moved 53,904 passengers to Japan and returned 17,968 medical evacuees to the United States. The majority of these figures were contributed by the four primary cargo types that had been in-theatre for almost two years.

There is be no better way to test the capabilities of a new aircraft type than during a war. On 27 September 1951, C-124 tests began at Tachikawa, Japan, from where over 20 flights were made to and from Korea. The average

Flying the C-46

First Lieutenant Billy Coleman, pilot, 437th Troop Carrier Wing

"During the time I was flying the route from Japan into numerous airfields in Korea, we were constantly battling the weather, the poor conditions of the runways and those treacherous approaches over the mountains. One of the toughest that comes to mind was Hoengsong (K-46). It was in a bowl, strictly VFR. The downwind and base were in the bowl, and on final, the wheels were almost rolling down the mountain side. This was one base you didn't want to tackle if the visibility was poor.

"Our C-46s hauled just about everything you could imagine. We never knew what we would be carrying until we went out to the plane. I can remember sometimes we would be loaded with toilet paper. This wasn't much weight, but just about every square inch inside the aircraft was filled up. Then we'd go out another day and the inside of the aircraft seemed empty. The cargo would be 10,000 lb [4536 kg] of ammunition strapped down on a few pallets. Nothing surprised me about our loads. If you could get it in through the door, then we could haul it.

"Our home base was located in Japan, at Brady Air Base. It only had 3,800 ft [1158 m] of PSP with a seawall at one end and a huge sand dune at the other. Flying out of there with 52,000 lb [23587 kg] was a real thrill! There was no such thing as aborting once you got going. You were either going to fly or go into the water. Take-off was always over the water!

"To the fighter pilots, I guess it seemed we didn't have much to do, and we were never close enough to the action to be in any real danger. I can recall one of these jocks riding back to Japan with us for some R&R. He was riding up front on the jump seat and he continually told us what an easy time we transport pilots had. At that time, I began discussing the weather situation with my co-pilot, figuring out what we were going to do as the ceiling had dropped at Itazuke (our destination), putting it below minimums, and the fact that we had fuel for one try and then, if we didn't make it, we might not have enough to make the alternate field! The fighter pilot got up, moved to the back of the plane and we didn't see him again until we had landed! I enjoyed flying the C-46 while in the Far East, and it did a great job for the war effort."

Left: ...and out it comes. Many willing hands combine with a truck and cable to pull* Honeymooners Special *from the hole it had fallen into on the runway. The parlous state of Korea's airfields was a constant hazard to operations.

Below: Passengers board a 437th TCW C-46 at Iwakuni for the long flight to Seoul. Previously based at O'Hare Airport, the 437th was one of the first Reserve components called up for war duty. Many of the C-46s were 'Hump' veterans.

Above: 1st Lt Billy Coleman is on the right of this trio of pilots posing outside the 85th TCS ops shack at Brady air base.

The 437th settled in at Brady Field and stayed there for the duration of the conflict. Although the operations into Korea were uncomfortable and often hazardous, the living conditions were far better than those experienced on the peninsula. This is the wing HQ building.

Above: The harsh Korean winters took their toll of those who tried to fight them. This C-47 paid the price while attempting to take off in a snowstorm from Hoengsong (K-46) in January 1952.

Right: A lone C-47 lands at Chinhae (K-10) in late 1951, inbound from Itazuke. According to the P-51 pilot who took the photo, it was loaded with food, winter clothing and, most importantly, liquor.

cargo weight on these flights was close to 35,000 lb (15876 kg), almost double the weight the C-54s could carry. The argument for bringing the C-124 in-theatre looked increasingly favourable, and Command supported it. The existing aircraft were getting older and were being overworked, as there was no time to do the proper maintenance. The demands put on CCC by 5th AF nearly exceeded its capacity to comply. The commanding general stated that if the C-124s could be brought over in sufficient numbers, they could easily reduce the number of other transports required to do the job, which would mean less crowded conditions at the major bases.

The use of the C-124 in the Far East had been approved long before this and the type was to have been introduced into regular rotation in September/October 1952. Under the circumstances, the commander requested that the Pentagon approve the use of the aircraft immediately. He also suggested that the C-124 begin replacing the C-54s of the 374th Troop Carrier Wing, to be effective from the early spring of 1952. A reduction in the number of C-47s and C-46s as a result was not mentioned; such a move would have been a disaster, because they were the only cargo aircraft able to operate on the short, gravel strips in South Korea. The first step in introducing the aircraft was to bring the C-124 Mobile Training Unit (MTU) from Chanute Field to Tachikawa.

Lack of experience

When the first C-124s reached Japan, there was a severe shortage of experienced aircrews, so some pilots and flight engineers were brought from Brookley AFB in the US – even some personnel from the C-74 programme were included. This was probably the most complicated, time-consuming transition the USAF faced during the course of the Korean War. The C-124 was a very complicated aircraft to fly. The pilot relied heavily on the panel engineer, who manned a large and complex wall of instruments. In later years, records indicated that only the training regimen of the B-36 was more difficult than that of the C-124. The numbers for this new aircraft were impressive: 127 ft (38.70 m) in length, with a 173-ft (52.70-m) wing span. The tail was 48 ft (14.60 m) off the ground. Most of the work stands and hangars available at the air bases were too small, making normal maintenance a problem.

The influx of experienced aircrews from the US was only a stopgap measure until the C-54 fliers could be checked out in the new aircraft. This was a burden on these pilots, who were expected to fly their regular rotation in the old Skymaster and then use their down time to become proficient in the Globemaster! During the first few weeks of this routine, the loyalty of the pilots was to their old C-54s, which had always been reliable through some stressful times. The C-124 was new, complicated and had not yet proved itself, at least to the pilots who flew it.

The first important task for the Globemaster was assigned long before the aircraft became operational. A critical shortage had developed of the drop tanks used by the F-86 Sabres, brought on by the 51st Fighter Wing's conversion to the F-86E, thereby increasing the number of Sabres flying patrols over the Yalu River. By early January 1952 the F-86s were using only one drop tank, which cut into their loiter time along the 'Alley'. The C-124s were

Right: A handful of large-scale set-piece paradrops were undertaken during the war, necessitating large numbers of transport aircraft. These C-46s line up at Taegu for the March 1951 Munsan-ni drop.

Below: The RAAF base at Iwakuni was a key pick-up point for USAF transports flying men and supplies to Korea. Taxiing between this C-119 and C-54 is a Meteor F.Mk 8 of No. 77 Sqn, RAAF.

The Douglas C-124 Globemaster was the largest aircraft to fly during the war, and was also one of the most demanding. Its transition to full war participation was slow and methodical. For the first few months it was not allowed to operate with a full load of troops until it had been proven safe and its crews fully checked out. These troops are seen boarding* Old Shaky *for a flight to Japan and some well-deserved R&R.

tasked with bringing full loads of tanks directly from the manufacturing plants to the forward bases at Suwon and Kimpo. They were offloaded and immediately placed on waiting F-86s, an indication of their low numbers.

During the first weeks of the C-124's introduction into the Korean War, the weight and type of its cargo was limited. The first six of these aircraft to arrive in the Far East in May 1952 were immediately put to work in the training role.

Brigadier General Chester McCarty, commander of the 315th Air Division, piloted the first scheduled C-124 flight from Japan to Korea (3 July 1952). The aircraft belonged to the 'Bully Beef' squadron (6th TCS) and it carried five J33 jet engines (used by the F-86 Sabre) each weighing 2 tons (1.97 tonnes), and approximately 30 crew members, photographers, dignitaries, etc. On the return flight from Seoul to Tachikawa, it carried a C-47 wing and aileron, used tyres, worn aircraft parts and empty oxygen cylinders being shipped to Japan for refilling. The number of curious onlookers at both ends of the flight numbered in the thousands.

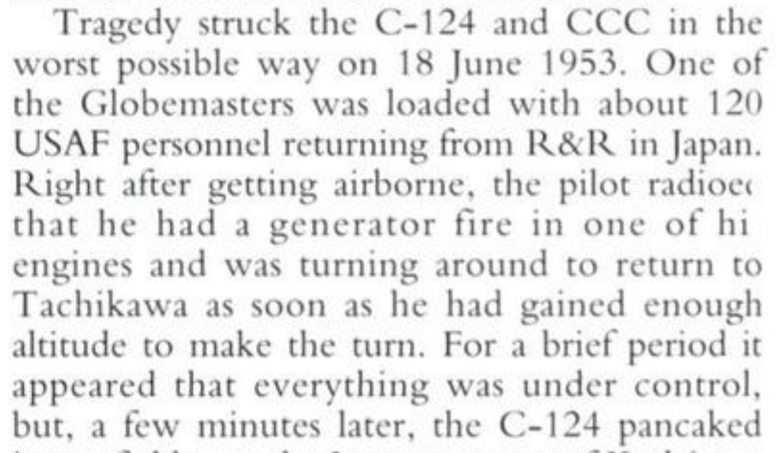
Initially, the new transports were not allowed to fly into Korea on a daily basis. The new aircrews honed their skills by making long hauls from Japan to Iwo Jima, with an occasional hop to Suwon or Kimpo. By no means was the C-124 immediately plugged into the regular rotation on the Japan/Korea/Japan runs. One of the more colourful 'practice' missions involved one C-124 and five C-119s hauling an entire army liaison squadron with its partially dismantled aircraft from Japan to Suwon. By 25 August, the Globemaster was making daily round-trip flights from Tachikawa into Korea.

By the end of September, the 374th Troop Carrier Wing had 26 of the big cargo transports on inventory. There had been a slight change of plan for the 374th, in that it would not lose all its C-54s as had been originally indicated. CCC decided to leave one squadron intact, the rest converting to the Globemaster. The squadron to retain its C-54s was the famous 21st TCS, better known as the 'Kyushu Gypsies'.

Varied loads

Within 60 days of the first scheduled flight, the C-124s had carried an assortment of regular freight items along with a 32-passenger bus and seven 31,000-lb (14060-kg) fire trucks to either Kimpo or Suwon. CCC records show that the first official medical evacuation involving the C-124 took place on 12 August 1952: the flight log indicated that 100 sick and wounded personnel were airlifted to hospitals in Tokyo. The final figures for the month of July showed that C-124s only flew 41 sorties, carrying 718 passengers and 420 tons of cargo. In comparison, the C-54s flew 2,550 sorties, carrying 66,000 passengers and 11,000 tons (10825 tonnes) of cargo. By the end of September, the pace had increased for the Globemaster: it flew 240 sorties, hauling 11,000 passengers and 2,400 tons (2361 tonnes) of cargo, plus making 590 air evacuations. Two months later, the sortie surge had reached 380 with 28,000 passengers, 4,500 tons (4428 tonnes) of cargo and 800 air-evacs. This phenomenal rate continued to increase well into 1953.

Tragedy struck the C-124 and CCC in the worst possible way on 18 June 1953. One of the Globemasters was loaded with about 120 USAF personnel returning from R&R in Japan. Right after getting airborne, the pilot radioed that he had a generator fire in one of his engines and was turning around to return to Tachikawa as soon as he had gained enough altitude to make the turn. For a brief period it appeared that everything was under control, but, a few minutes later, the C-124 pancaked into a field near the Japanese town of Kodaira, a few miles from where it had taken off. The ruptured fuel tanks ignited and all 129 people on board were engulfed by the fire. It was, at the time, the greatest aircraft disaster in history. Many on the passenger list were F-86 pilots from the 18th Fighter Bomber Wing. Even today, this tragic accident is remembered by all military types who had been stationed in the



As well as its giant clamshell doors, the C-124 had a unique platform for lifting palleted loads. This scene was recorded in 1953 at Kunsan.

Above: An L-20 Beaver can be seen in the background as passengers walk aboard the C-124 for the flight to Korea. Although the Globemaster contributed hugely to the war effort, its record was marred by a tragic crash in June 1953 which killed all 129 people on board – at the time the world's worst aircraft disaster.

Left: By the early spring of 1953 the C-124 had become the heavy-hauler of choice. These two aircraft at Suwon had just brought in a mixed load of equipment and personnel from Japan. With two full tactical wings based at Suwon, the CCC aircraft were on a busy schedule to meet the demands. Earlier, C-124s had been used to satisfy the heavy demands for F-86 drop tanks when supplies from the US ran dangerously low.

Heavy Haulers

Left: The 4th Fighter Wing's HQ had its own C-47, used primarily for shuttling spare parts to support its large fleet of F-86s. If just one part was required, it would have been impossible to divert one of CCC's aircraft from its vital supply tasks, so the C-47 was an invaluable asset to the smooth running of the Sabre unit.

Below: The tricoloured fin identifies this C-47 as belonging to the 8th Fighter-Bomber Wing. The aircraft is seen in 1953 shortly after the wing had converted to the F-86F. The C-47 spent a lot of time in the air on the shuttle between the wing's base at Suwon (K-13) and the rear-echelon maintenance facility in Japan.

Far East during the early summer of 1953.

By the time the truce was signed on 27 July 1953, Combat Cargo aircraft had carried 697,000 tons (685848 tonnes) of supplies, mail and equipment. The passenger totals exceeded 2,500,000, and 314,500 wounded had been evacuated to a safer environment in Japan. Of course, these totals exceed the totals for the war, but they include instances when one man was, for example, taken from a crude forward area by C-47, brought into a major base and then ferried to Japan, so that one person might have been moved two or three times before landing in Japan. Another statistic that has to be added is the additional 18,000 tons (17712 tonnes) of supplies that CCC air-dropped to troops on the ground.

More tonnage than MATS

The 315th Air Division carried more tonnage and passengers in the three-year Korean War than did the entire Military Air Transport System, worldwide, in the five-year period before the war started. This made the two main air terminals of Tachikawa and Suwon the busiest airfields in the world, by a wide margin.

The statistics that Combat Cargo Command compiled during the Korean War were as impressive as those achieved by the fighter or fighter-bomber organisations. Each of these types fought its own kind of war, and they were all essential to a successful outcome. Right after the war ended, General Otto P. Weyland, commander of FEAF, stated that his command had learned three major lessons about the employment of transport aircraft in war: all airlift missions and their priorities should be determined by the theatre commander; airlift could not be allocated exclusively for the use of any single service except for special one-time requirements; and all airlift in a theatre should be concentrated to a maximum degree in one command for flexibility and optimum utilisation. This wisdom was not just taken for granted, and the lessons learned in Korea were reflected in operational policy for decades to come. The Korean War provided more of a 'test and tune' for the entire air cargo system than had the Berlin Airlift. **Warren E. Thompson**

Above: Indicative of the kind of weather that faced crews in Korea, this view was captured from the Osan tower caught during a two-day rainstorm which hit the base in June 1953. As well as causing widespread flooding, the storm has claimed a victim in the form of the unfortunate 319th FIS F-94B which sits forlornly in the sodden grass after having slid off the runway.

Its wheels choked, a C-124 has its starboard engines run-up on to the ramp at Taegu in 1953. By this time the C-124s routinely carried full loads of passengers.

'Connies' in uniform

Lockheed Constellation/Super Constellation Military Variants

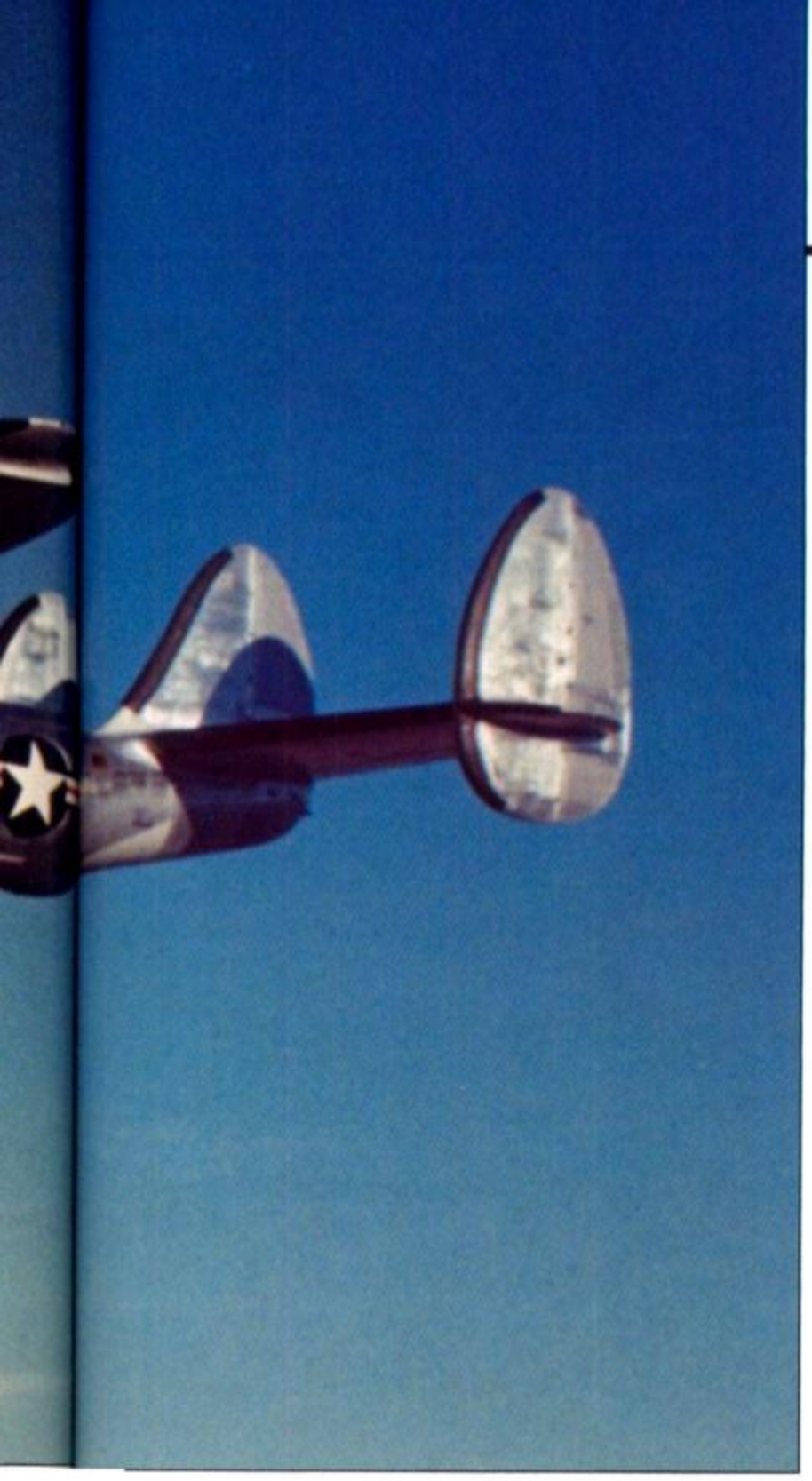
***Above:** The fastest of all the Constellations were the four R7V-2/YC-121F-LOs used by the US Navy and USAF to evaluate the advantages of turboprop power. The USAF YC-121Fs were evaluated alongside two YC-97J Stratofreighters and two YC-131C Samaritans. Despite increased speed and load carrying capability, the four R7V-2/YC-121Fs were to be the only US military turboprop 'Connies'.*

***Below:** Two Lockheed designs, both impressed into military service, were prime examples of the enormous strides made in civil aircraft design during the 1930s and early 1940s. The first C-69, 43-10309 (c/n 1961), towers behind the sole UC-101-LO, 42-94148 – impressed Lockheed 5C Vega NC14236.*

Military 'Connies', just like civil Constellation and Super Constellation variants, were outnumbered and outlived by their sturdier and more reliable Douglas competitors (mostly C-54/R5Ds and C-118/R6Ds in military service, and DC-4, DC-6 and DC-7 models with airlines). However, endowed with more pleasing lines, civil and military 'Connies' easily won the battle for the hearts of their operators and of aviation enthusiasts around the world. From a more pragmatic point of view, it was the development and service career of 'Willy Victor' and Warning Star airborne early warning variants which earned a well-deserved place in military history for the 'Connie'.

Although the Lockheed Constellation first flew in mixed civil/military markings – the aircraft was registered NX25600, finished in olive drab and grey camouflage, designated C-69-LO, and given the USAAF serial 43-10309 – it had been conceived as one of the earliest pressurised airliners. Its design traced its origin to work undertaken in 1938 in response to a boom in US airline operations. Spurred by the entry into service of modern twin-engined transport aircraft (the Boeing 247 in March 1933, the Douglas DC-2 in May 1934, the Lockheed 10 in August 1934, the Douglas DC-3/DST in June 1936, and the Lockheed 14 in October 1937), scheduled airline traffic in the United States jumped from 179 million passenger-miles in 1934 to 805 million passenger-miles in 1937. To cope with such explosive growth – which was achieved in spite of the nation's economy being in the grip of the Great Depression – airlines needed larger and faster aircraft. Fortunately for the aircraft manufacturers, the ebullient airlines had the revenues to finance the acquisition of such aircraft.

Vying for the upper hand in this emerging market, Boeing, Douglas and Lockheed



Eleven early C-69/Model 049s (the majority with upper cockpit windows, deleted on production 049s) are seen in the final stages of manufacture at Burbank. Other types visible include a C-45, Lodestar/Hudson/Harpoons, P-38s, a Lockheed 12 and a UC-78 Bobcat.

designed four-engined, longer-ranged transports. Douglas succeeded in flying its DC-4 first in June 1938, but was unable to secure production orders for that aircraft. (This triple-tailed aircraft was later redesignated DC-4E – E for experimental – as it was not related to the smaller, single-tailed DC-4 which went into production.) Boeing flew its Model 307 six months after the Douglas contender but succeeded in having the 307 Stratoliner, the first pressurised airliner, placed in revenue service in June 1940.

Meanwhile, Lockheed trailed behind, for its proposed Model 44 Excalibur did not get the nod from airlines. Instead, Lockheed began work during the summer of 1939 on the all-new Model 49 Excalibur A, soon renamed Constellation. Promising to be faster and roomier than the pressurised Boeing 307 and the unpressurised single-tailed Douglas DC-4, the pressurised Constellation elicited much interest from airlines, including those which had ordered Boeing and Douglas four-engined airliners. Consequently, Lockheed was able to finalise an initial order for nine aircraft from Transcontinental and Western Air (TWA) prior to America's forced entry into World War II, and was then on the verge of finalising contracts for 31 more aircraft from TWA, 40 aircraft from Pan American Airways, and four aircraft from an unidentified customer. The Japanese offensive in the Pacific temporarily ended the Constellation's civil career while the first Model 49s were barely under construction.

When America was faced with having to fight on many far-flung fronts – in Europe, Africa, Asia and the Pacific – the Army Air Forces and the US Navy only had a token air transport capability. Their most modern aircraft were early military variants of the twin-engined Douglas DC-3 (mostly C-47s and R4D-1s). (The C-47's range with full load of 6,700 lb/3040 kg barely reached 1,600 miles/2575 km, not enough for the critical West Coast-Hawaii leg on the long route to Australia and the combat zone in the Southwest Pacific.) As dependable as these legendary 'Gooney Birds' soon became in military service, they were not suited for long overwater operations to link the 'Arsenal of Democracy' with distant theatres of operations. The need for four-engined transports with greater range and payload than

The WV-1 (PO-1W) could carry a dorsal AN/APS-45 height-finding radar and a ventral AN/APS-20 search radar, providing direction and height data for target aircraft. The 'Willy Victor's large cabin provided more space for avionics and mission specialists than, say, the PB-1W.

A scale mock-up of the Model 44 Excalibur is seen under construction (above). This was followed by a full-scale mock-up (above centre). The final Model 49 Constellation benefitted from wind tunnel testing (above right).

the C-47s and R4Ds was urgent, to say the least. Unfortunately, even the airlines then had only a few of these aircraft in service (mostly Pan American's flying-boats and the first Boeing 307s). They were rapidly impressed into service and contracts for new four-engined transports were swiftly taken over by the USAAF. Included in such contracts were the nine Lockheed Constellations then under construction for TWA.

Anticipating the need for long-range transports, the Army Air Forces had concluded in 1941 that the yet-to-fly single-tailed DC-4 would be better suited to its likely wartime needs than the smaller, more complex Boeing Stratoliner, and that it would be available more than a year before the faster Lockheed Constellation. Accordingly, the War Department had prevailed upon the airlines to relinquish the DC-4s they had on order; a contract for 52 such aircraft, which were given the C-54-DO military designation, had been awarded to Douglas in September 1941. Lockheed, meanwhile, was left free to continue work on Constellations ordered by TWA, albeit at a reduced pace, as it had to give priority to military aircraft production (mostly P-38s and Hudson variants).

On the last day of summer in 1942, after the first 10 months of the war had made the need for long-range transports even more acute, the War Department purchased the nine Constellations then under construction for TWA. In addition, a contract for an additional 150 aircraft, most of which were intended to be completed to full military standard as C-69As and C-69Bs – or, with less spartan accommodation, as C-69C and C-69D staff transports – was awarded to Lockheed on 29 September 1942.

Designated C-69-LO, the first of the Constellations originally ordered by TWA flew at Burbank, California, on 9 January 1943. By then, however, Douglas C-54s were already in service with the USAAF Air Transport Command and production of that Douglas transport was rapidly gaining tempo in the Santa Monica and Chicago plants. Consequently, production of C-69s was never given priority and only a dozen aircraft were accepted by the USAAF before VJ-Day. The others were cancelled, bringing to an end the Constellation's first period of military service.

As soon as the war ended, airlines rushed to order Constellations, including C-69s which were refurbished by Lockheed as Models 049 and 149 after being relinquished by the USAAF. Constellations first went into scheduled service with TWA, initially between New York and Paris on 5 February 1946 and then between New York and Los Angeles on 1 March 1946. Afterward, the type was rapidly developed as Models 649, 649A, 749 and 749A with more powerful engines, additional fuel tanks, and increased gross weight to meet commercial requirements. With the availability of these better-performing variants, the Constellation went back into military service after the US Air Force ordered 10 Model 749s (nine as C-121As and one as a VC-121B) in February 1948, and the Navy contracted for two Model 749As as PO-1W airborne early warning aircraft (more details on these AEW platforms are given later) in September 1948.

Notwithstanding these 1948 orders for late Constellation variants, the triple-tailed Lockheed would have had little impact on military aviation had it not been for the Navy's financing of improved engines and Lockheed's development of the stretched Super Constellation.

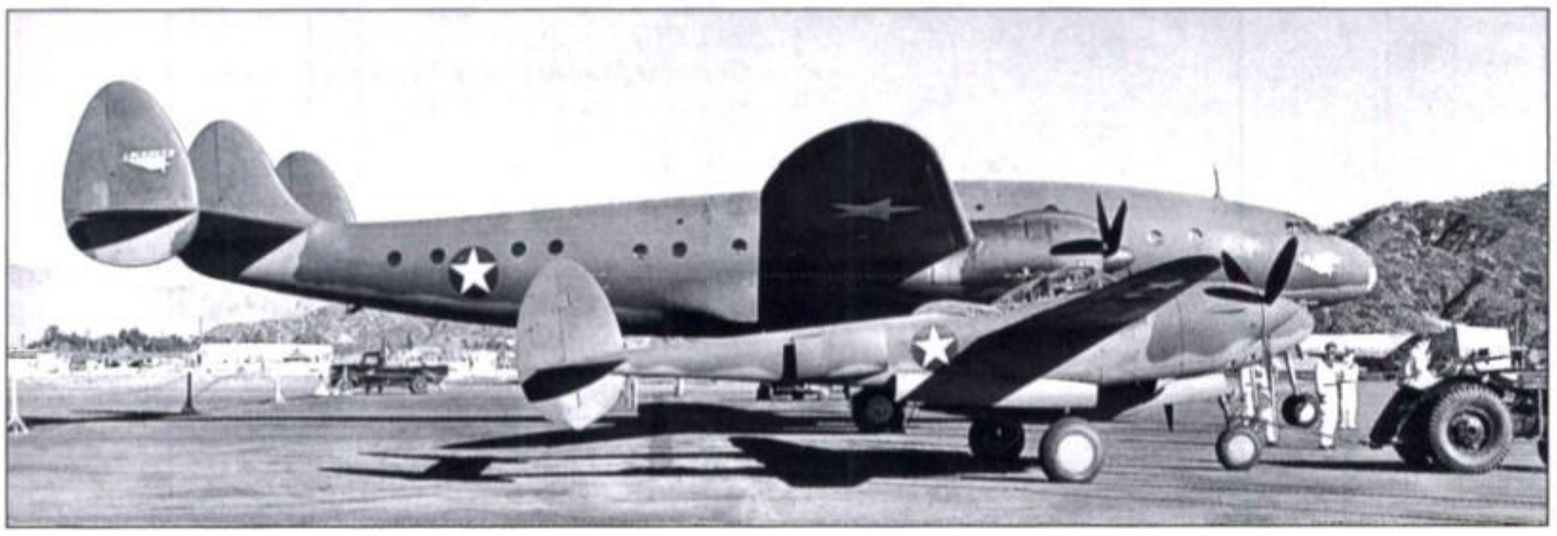
USN influence

The Navy's influence in securing the development of the Super Constellation series has generally been overlooked, for the type is better remembered as an airliner and more 'Connies' and Super 'Connies' were built for civilian customers than for the military. Moreover, development of the Super Constellation had been initiated by Lockheed for civilian customers with the aim of reducing seat-mile costs by increasing seating capacity. To that end, Specification Report for a proposed Model 949 featuring an 18-ft (5.49-m) fuselage stretch was issued in May 1948. However, development delays with the Wright Turbo-Compound Cyclones which were to power this proposed airliner variant led to the suspension of further work on the Model 949. Work was resumed in February 1950, with activities concentrating on the Model 1049 with an 18-ft 5-in (5.61-m) fuselage stretch. This airliner variant was offered to

Burbank's production line is seen soon after World War II. At this time Lockheed was concentrating on converting Constellations built for the USAAF to airliner configuration. These are Model 049s, as indicated by the absence of glazing above the cockpit.

'Old 1961'

The first 'Connie' of all, C-69-LO NX25600 (c/n 1961), made its first flight on 9 January 1943 and went on to serve as a testbed for most of the later airframe and powerplant refinements of the Constellation family. Retired by Lockheed in late 1958, 'old 1961' was sold, stripped for spares and scrapped.



Above: Adorned with the Lockheed logo on its nose and tails, '1961' is seen prior to its hand-over to the USAAF.

Left: One of the 13 YP-38-LO Lightning service test aircraft is positioned next to the C-69 prototype. Lightning production was one of the factors that slowed the Constellation programme.

Below: Converted as the prototype Super Constellation in 1950, '1961' was rolled out in this blue and white trim in October as NX6700. It flew in its new guise for the first time on 13 October, later becoming N67900. After 10 flights the aircraft's nacelles were painted blue and the cockpit roof finished in white.

Below: During 1952 the aircraft was modified as an aerodynamic prototype for the PO-2W. The ventral radome was fitted and tested before a dorsal radome was added; the tip-tanks are from an earlier 1952 test programme.

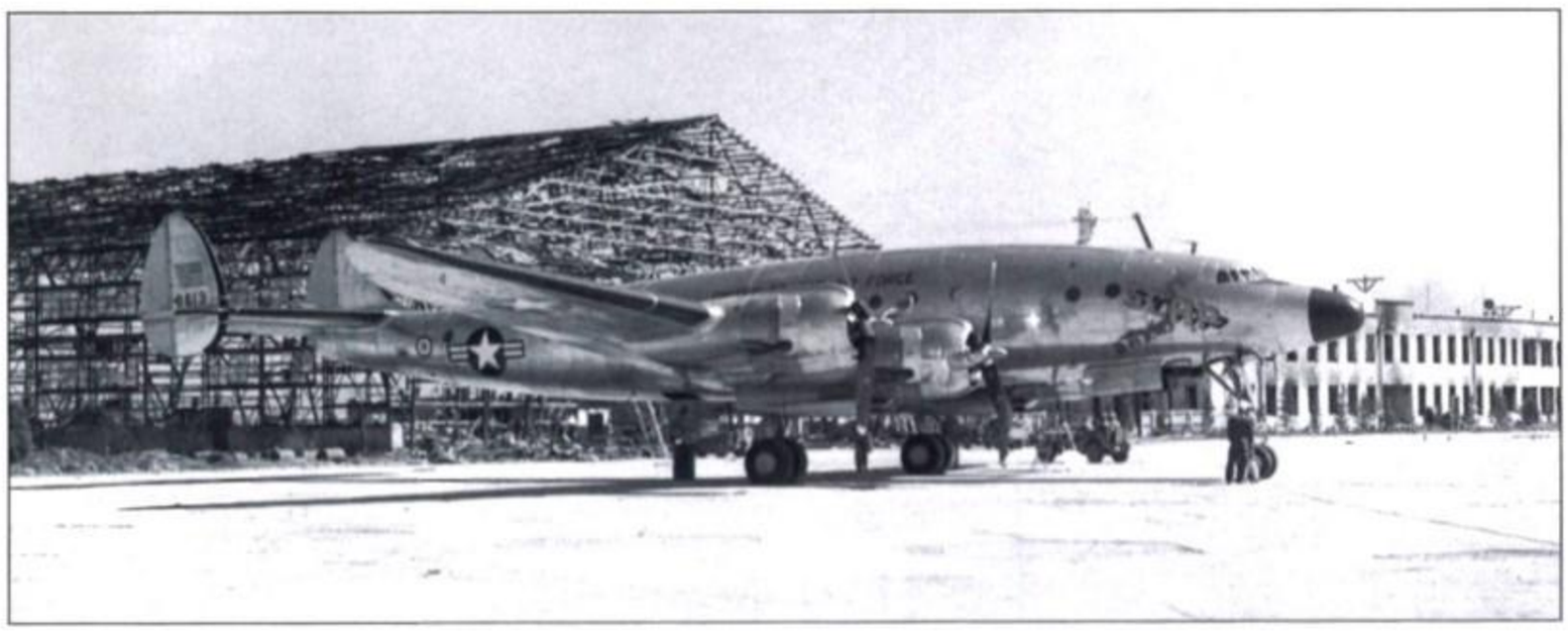
Below: An Allison YT56 turboprop and a three-bladed Curtiss propeller was flight tested in theNo. 4 position from April 1954. By this time c/n 1961 had gained its final colour scheme of light grey with a red upper cheat line.

airlines initially with Double Cyclones, but with the promise of later developments featuring increased gross weight and more powerful Turbo-Cyclone engines.

An initial order for 14 Double Cyclone-powered Model 1049s was placed by Eastern Air Lines in April 1950, but the second order for Super Constellations came from the USN. Significantly, contract NOa(s) 51-025 of 14 July 1950, for six PO-2Ws, called for these airborne early warning aircraft with the Super Constellation's stretched fuselage to be powered by Turbo-Cyclone engines and to have provision for tip tanks to increase range (these tanks were later made available for civilian Model 1049Gs). However, the Navy's primary contribution to the success of civil and military Super Constellations (and that of the rival Douglas DC-7) was its sponsorship of the development of the Turbo-Cyclone version of the Wright Double Cyclone (military R-3350) 18-cylinder radial engine.

Development of the Turbo-Cyclone was initiated to cope with the steadily increasing gross weight of Lockheed Neptune maritime patrol aircraft. Featuring three 'blow-down' turbines to convert into useful energy some 20 per cent of heat energy normally lost through the engine exhaust, the maximum take-off rating of these efficient but complex radial engines increased from the 2,500 hp (1865 kW) of the most powerful Double Cyclone to 3,250 hp (2424 kW) and eventually to 3,500 hp (2610 kW). With Turbo-Compound engines due to enter naval service following the placing of a 1948 order for P2V-4s, the Navy opted to use the same engines for its new AEW aircraft, thus making it possible to increase their gross weight, fuel load and endurance.

Super Constellations powered by Turbo-Cyclones were also ordered as military transports by the Navy (R7V-1s) and the Air Force (C-121Cs and ex-Navy R7V-1s as C-121Gs). Another of these aircraft, initially ordered by



General MacArthur's transport during the Korean War was VC-121A 48-0613* SCAP *(for Supreme Commander Allied Forces Pacific), seen above with its pilot, Lt Col Story and Kimpo base commander, Col Lee.

the Navy but completed as the VC-121E Presidential transport, became the first aircraft to use the 'Air Force One' callsign. Four other Navy-ordered Super Constellation transports were completed as R7V-2s powered by Pratt & Whitney T34 turboprops. The fourth R7V-2 subsequently served as a testbed for Allison 501 turboprops before being transferred to the USAF as a T34-powered YC-121F, along with another ex-Navy R7V-2. Even though the turbine-engined YC-121Fs had substantially better performance than the C-121Cs powered by R-3350 radials, the Air Force did not go ahead with its plan to order turboprop-powered Super Constellations as C-134s.

The Military Air Transport Command became a major Super Constellation operator, with a peak inventory of 71 aircraft (including ex-Navy R7V-1s redesignated C-121Gs) being recorded in June 1959. The last of these aircraft were withdrawn from MATS service in 1968 but, seven years earlier, C-121 transports had entered service with the Air National Guard. The last Guard squadron to fly C-121s was the 150th Aeromedical Transport Squadron, Pennsylvania ANG, which disposed of its Super Constellations in the spring of 1973. Afterwards, a pair of VC-121C staff transports served with the National Guard Bureau until phased out in June 1975.

Having taken the lead with the development of airborne early warning aircraft with its Project Cadillac, which first resulted in the Grumman TBM-3W and then the Boeing PB-1W, the US Navy sponsored further AEW research in the immediate post-World War II period. The resulting pair of Lockheed PO-1Ws, which used Constellation airframes and first flew in June 1949, was followed by 142 WV-2s for the Navy and 82 RC-121C/Ds for the Air Force with Super Constellation airframes. Initially extending radar coverage well out over the Atlantic and the Pacific during the critical days of the Cold War, the Navy's 'Willy Victors' ('Willy Victor' being an unofficial nickname derived from the WV designation) and the Air Force's Warning Stars (Warning Star being the official name for the Air Force RC-121s) gained their battle spurs during the war in Southeast Asia.

With the benefit of hindsight and the availability of declassified Soviet records from the late 1940s and early 1950s, it is now easy to make light of the fear deeply felt by Western politicians and military leaders in those years. During World War I, only a few American civilians had been killed in German submarine attacks. During World War II, the number of civilians killed in enemy action was greater but remained small by comparison with those in Europe or Japan. (Most of these casualties occurred in the Philippines, but civilians were also killed in the Territory of Hawaii and the Territory of Alaska. In or close to the continental USA, civilian losses were limited to those resulting from U-boat attacks against coastal shipping and such desultory Japanese operations as the bombing of an isolated forest area in Oregon by a Yokosuka E14Y1 'Glen' submarine-borne floatplane, shelling of oil facilities in California by submarines, and haphazard paper balloon attacks.)

When the United States Air Force was established as a separate service on 18 September 1947, the situation regarding civilian deaths had not changed. However, within two years the threat to US civilians grew dramatically. On 23 October 1947, 48 Tupolev Tu-4 heavy bombers (reverse-engineered Boeing B-29s) were seen flying over Moscow. Twenty-two months later, on 29 August 1949, the first Soviet nuclear device was detonated in the Kazakhstan desert near Semipalatinsk. For the first time, the United States appeared to face the threat of large-scale destruction and heavy civilian losses at home. Yet, at the end of 1949, defence against heavy bombers carrying atomic bombs

In February 1955, to mark the 100 million man-hours of work on the Constellation, eight 'Connies' of various types were assembled for a series of publicity pictures. Aircraft present were an R7V-2, a Model 1049D (N6501C of Seaboard & Western), examples of the WV-2, R7V-1 (BuNo. 131659), Model 1049E (HK-176X of Avianca), N67900 (c/n 1961 in its turboprop testbed guise) and RC-121D (52-3415). Not visible is VC-121E transport 53-7885.

Air Defense Command's interception 'A-team' of the late 1950s comprised two Lockheed products – the F-104A Starfighter and RC-121D Warning Star, seen here in a USAF photograph of the period.

was left to only 20 squadrons, five with piston-engined all-weather interceptors having marginal performance and 15 with early jet fighters lacking radar and thus suitable only for clear weather operations. Confronted with this threat and the lack of preparedness, the USAF rapidly amassed a large force of all-weather jet interceptors, and expanded radar coverage.

To protect population and industrial centres from the perceived threat of Soviet nuclear bombers, the United States progressively expanded its radar coverage. Outside of the 48 contiguous states, that coverage was first extended to Alaska to cover the most direct route from Soviet bases to targets in the United States. This was followed by the DEW (Distant Early Warning) Line extending across northern Alaska and northern Canada, and Pinetree extending across mid-Canada. Nonetheless, the DEW Line and Pinetree left gaps over the North Atlantic and in the Pacific. To plug these gaps, a Contiguous Barrier was to be provided in the Atlantic by five Air Force-manned Texas Towers off the coast of New England, five Navy radar picket ships, airborne early warning Navy WV-2s and Air Force RC-121s, and Navy AEW blimps (ZP2N-1-Ws and ZPG-3Ws, respectively redesignated EZ-1Bs and EZ-1Cs in 1962). Another Contiguous Barrier was to be provided along the West Coast, from the border with Canada to central California, by five radar picket ships and Air Force RC-121s. Next, the Navy provided the Pacific extension of the DEW Line, from Hawaii to the Aleutians, with radar picket ships and WV-2s.

First naval AEW experience

The Navy had first acquired experience with the AEW variant of the Constellation when the two PO-1Ws had been used for operational trials by Airborne Early Warning Development Squadron Four (VX-4; earlier, while still designated VPB-101, this squadron had operated Boeing PB-1W AEW aircraft from the spring of 1946) then based at NAS Patuxent River, Maryland. Additional PO-1W experience was gained in 1953 when these AEW aircraft were assigned to Airborne Early Warning Squadron One (VW-1) at NAS Barbers Point, Hawaii, to train crews for the PO-2W (redesignation of this variant to WV-2 and to EC-121K occurred in 1954 and 1962, respectively) which was soon to enter service.

To staff its contribution to radar coverage for North America, the Navy first commissioned its Atlantic Airborne Early Warning Wing at NAS Patuxent River in July 1955. As part of that wing, three operational AEW squadrons – AEWRONs Eleven, Thirteen and Fifteen (VW-11, VW-13 and VW-15) – were commissioned at monthly intervals between 1 August and 1 October 1955, and went on to operate first on the Contiguous Barrier and then on the North Atlantic barrier farther out at sea. VW-13 was short-lived, as it was decommissioned on 15 September 1957, but the other two lasted longer, operating from NS Argentia, Newfoundland, Canada, until mid-1961 when Air Force long-range ground stations extended radar coverage across Greenland. Shortly before that was achieved, VW-15 was decommissioned, leaving VW-11 as the only AEWRON in the Atlantic. In that capacity, VW-11 moved to NS Keflavik, Iceland, to 'plug the GIUK (Greenland-Iceland-United Kingdom) radar gap'. VW-11 completed that assignment in November 1965 and was decommissioned as the last AEWRON. Thereafter, coverage of the GIUK gap was provided by Air Force EC-121s. In addition to fulfilling their primary AEW mission, Navy WV-2s/EC-121Ks serving in the Atlantic played important roles in support of the US manned space programme (starting with Alan Shepard's *Freedom* 7 suborbital flight on 4 May 1961) and then during the 1962 Cuban Missile Crisis.

The Navy activated its Pacific Airborne Early Warning Wing at NAS Barbers Point, Hawaii, in January 1956. Two operational squadrons (VW-12 and VW-14) and one maintenance/training squadron (VW-2) were assigned to this airborne component of COMBARFORPAC (Commander Barrier Force Pacific). Operating from Barbers Point, Midway Island, and Kodiak in the Aleutians, the two operational squadrons were consolidated with the maintenance

Two MATS R7V-1s share the pre-delivery ramp at Burbank with Air France and KLM Super Constellations during 1953. The aircraft nearest the camera, BuNo. 128435, initially served with VR-8, before transferring to VR-7 in mid-1955. Both units were part of Fleet Logistic Support Wing, Pacific, operating under MATS command.

Above: Designed to detect, and assist fighters to destroy, Soviet bombers approaching the continental US, the Warning Star first saw action in Southeast Asia.* Camella City 49er, *EC-121D 53-3400 of the 552nd AEW&CW, is seen on a busy Da Nang apron in December 1966. Warning Stars provided the US forces with early warning of MiG take-offs and the control and communications facilities required to conduct both offensive and defensive sorties.

Left: In order to collect and relay the information gathered from Air-Launched Acoustical Reconnaissance Sensors (ALARS) sown along the Ho Chi Minh Trail, the USAF converted 30 surplus ex-US Navy EC-121Ks/Ps and WC-121Ns as EC-121Rs. A coat of camouflage completed the conversion work; the aircraft served for four years.

squadron on 1 February 1960 to form Airborne Early Warning Barrier Squadron Pacific. This AEWBARRONPAC was finally disestablished on 30 April 1965. While assigned first to COMBARFORPAC and then to AEWBARRONPAC, the WV-2s/EC-121Ks flew 20,265 sorties and logged 245,000 flight hours, mostly on AEW patrols but also in support of 'TransPac' Air Force, Navy and Marine aircraft deployments, and in support of manned and unmanned space missions.

After receiving its first RC-121Cs in May 1954, the Air Force organised two RC-121 squadrons to complement WV-2 operations and bridge the radar gap between Navy patrols far out at sea and its own land-based and Texas Tower coverage. The 551st Airborne Early Warning and Control Wing was activated at Otis AFB, Massachusetts, in December 1954 for East Coast operations, while the 552nd AEW&CW was activated at McClellan AFB, California, in July 1955 for West Coast operations. Appropriately, both Air Force squadrons flew AEW patrols farther 'in-shore' than Navy WV-2 patrols. In addition, their RC-121s (redesignated EC-121s in September 1962) flew a variety of other support missions including tracking of ballistic missile tests and manned space flights, as well as combat support during the 1962 Cuban Missile Crisis. The 551st AEW & CW was inactivated in December 1969 but the 552nd, which had picked up a combat support assignment in Southeast Asia beginning in April 1965, soldiered on for another 11 years. Temporarily inactivated as an EC-121 unit at McClellan AFB in May 1976, the 552nd was reactivated two months later at Tinker AFB, Oklahoma, to fly Boeing E-3s.

Southeast Asian operations

When America was progressively pulled into the Vietnamese quagmire, the only military Super Constellations in the area were the WC-121Ns of the 'Typhoon Hunters' of VW-1 and the EC-121Ks and EC-121Ms of the 'World Watchers' of VQ-1 (FAIRECONRON ONE). The 'Peter Rabbit'-coded aircraft of the latter were rapidly sent to the nascent war theatres to collect Elint/Sigint from the new foe and to provide radar coverage for US and South Vietnamese aircraft taking part in early Flaming Dart offensive operations against the North. In that role, they operated first from Sangley Point in the Philippines and then from Da Nang in the Republic of South Vietnam.

The Air Force initially sent a five-aircraft

EC-121s were frequent visitors to the UK, patrolling the Greenland-Iceland-United Kingdom (GIUK) gap, monitoring Soviet excursions into the Atlantic. The final USAF 'Connie' in the UK was EC-121T 54-2307, which graced the Mildenhall Air Fete in August 1978.

EC-121D Big Eye detachment from the 552nd AEW & CW to Tainan AB on Taiwan in April 1965 and, rotating from Tan Son Nhut in South Vietnam, these aircraft first supported Rolling Thunder operations on 17 April 1965. They also provided radar coverage at a time when it was feared that the North Vietnamese would use their newly acquired Il-28s to mount air raids against the South.

The Air Force EC-121 detachment in Southeast Asia moved in February 1967 to Ubon RTAFB in Thailand (where it was renamed College Eye in March), to Udorn RTAFB in July 1967, and finally to Korat RTAFB in October of that year. Progressively, College Eye aircraft were upgraded to Quick Look configuration with QRC-248 sets to interrogate the SRO-2 IFF transponder (NATO 'Odd Rods') of Soviet-supplied fighters, and then to EC-121T standard (first deployed to Southeast Asia in 1971). In the war zone, EC-121s proved highly effective, especially after the installation of QRC-248 interrogators and Rivet Top Sigint equipment. (Use of the QRC-248 was first credited with helping in the destruction of an enemy aircraft on 24 October 1967 when an F-4D was guided to a gun kill of a MiG-21, that victory being credited to Major William L. Lirk and First Lieutenant Theodore R. Bongartz of the 333rd TFS, 355th TFW.) Now going by the DISCO callsign, EC-121s guided USAF fighters to their last kill of the war on 8 January 1973 when Captain Paul D. Howman and First Lieutenant Lawrence W. Kullman of the 4th TFS, 432nd TRW, dispatched a MiG-21 with a Sparrow missile. The last EC-121Ts, with QRC-248 sets and Rivet Top stations, departed from Korat RTAFB in August 1974 on their way back to their home station at McClellan AFB.

In addition to serving in their Elint/Sigint role with VQ-1 and in the AEW role with Big Eye/College Eye/Disco, military Super Constellation variants served in Southeast Asia in the airborne radio/television relay role (Navy EC-121Js and Air Force EC-121Ss) and in the data relay role (Air Force EC-121Rs).

Phased out from active duty service in 1976,

EC-121s served with the 915th Airborne Early Warning and Control Group, Air Force Reserve (AFRes) until October 1978 from their home station at Homestead AFB, Florida, and on deployments from NS Keflavik, Iceland.

Other military 'Connie' roles

In addition to their primary transport and AEW activities, and other previously mentioned roles such as radio/TV relay, weather reconnaissance, and Elint/Sigint, military Constellations and Super Constellations were adapted for a variety of roles. Notably, they were used in support of missile re-entry, space capsule recovery and electronic warfare support activities. Details of these various adaptations are provided in the following variant survey.

Before concluding, mention must be made of ex-airline Super Constellations which served as transports with the Indian and Indonesian Air Forces and as maritime patrol aircraft with the Indian Navy. **René Francillon**

Airworthy 'Connies'

Of five Constellations maintained in airworthy condition in 2000, four are ex-military aircraft. (The sole flyable former civil 'Connie' is ex-Slick Airways L-1049G N6937C, operated in TWA colours by Save-a-Connie Inc. of Kansas City, Missouri.)

The so-called 'MATS Connie' (top) – C-121A N494TW (ex-48-0609) – is operated by the Constellation Group. Retired by the USAF in 1968, and operated as a bug sprayer in Canada (as C-CXKO), the aircraft was eventually sold to film star and aviation enthusiast John Travolta in 1984. Acquired by Vern Raburn in 1987, the aircraft was extensively restored before making numerous appearances at air shows in North America and Europe. In 2000 it was offered for sale with an asking price of $1.2 million.

The Constellation Historical Society operates N73544 on behalf of owner D. Benny Younesi. Based at Camarillo Airport, California, the C-121C (formerly 54-0156) was restored to working order in 1994. Also based at Camarillo in 2000 was N548GF (above), a former EC-121T serialled 53-0548 and operated by Global Aeronautical Foundation.

VH-EAG *Southern Preservation* (the former C-121C 54-0157, below) is operated by the Historical Aircraft Restoration Society of Australia and wears a colour scheme reminiscent of that carried by QANTAS 'Connies'.

Military Constellation variants

C-69

The first military version of the Constellation comprised two groups of aircraft. A batch of nine aircraft – which had been under construction for Transcontinental and Western Air when America entered World War II – was purchased from TWA under contract W535 AC-32809, finalised on 20 September 1942. Nine days later, Lockheed was awarded contract W535 AC-26610 for an additional 150 aircraft.

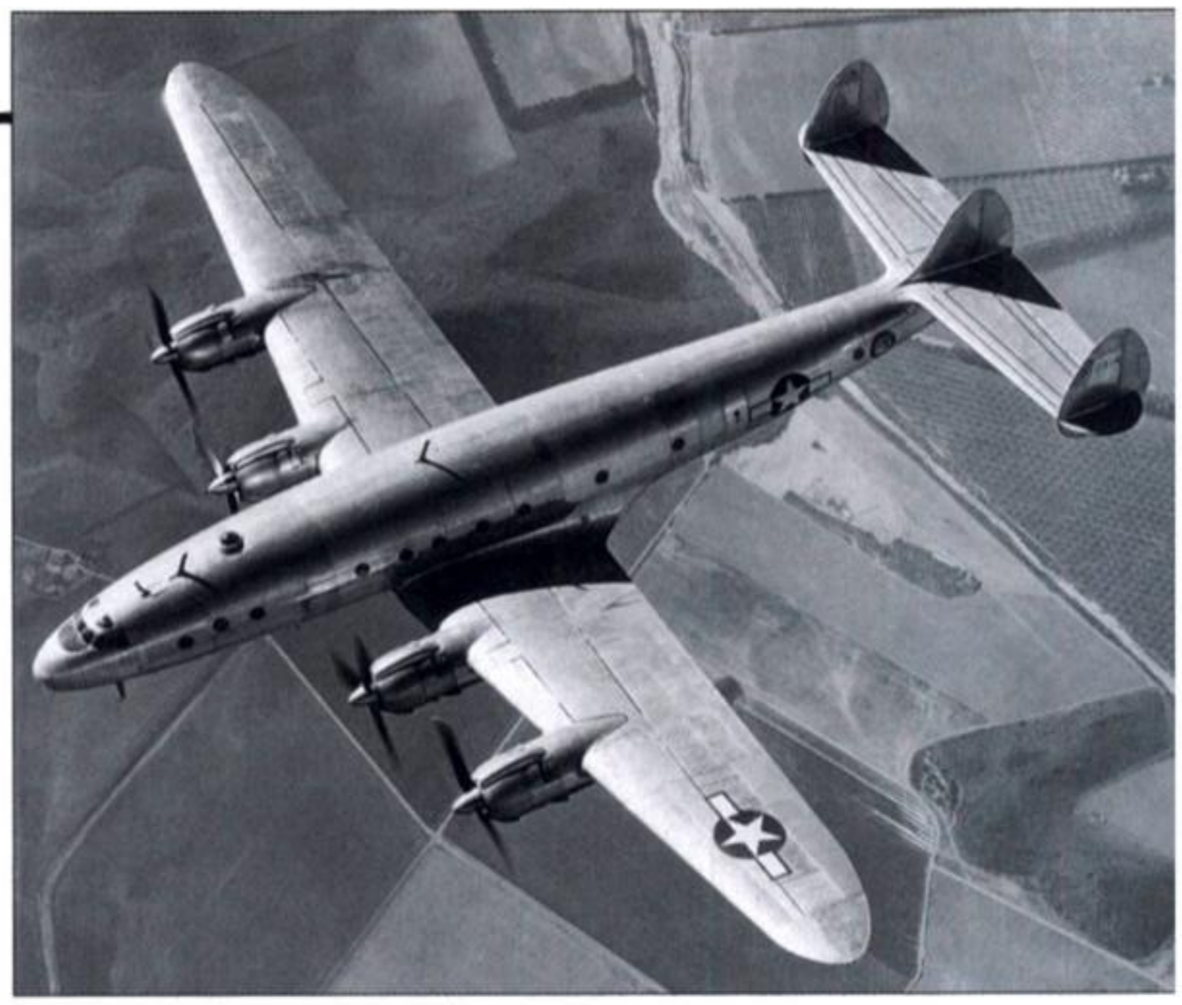
Aircraft from the first batch were given C-69 designations, one being converted as the XC-69E. The first 10 aircraft from the batch ordered directly from Lockheed were also designated C-69s; one was completed as the sole C-69C and four were still under construction at war's end. The uncompleted C-69s (42-94554 to 42-94557) were not accepted by the USAAF and were sold back to Lockheed by the War Assets Administration for delivery to BOAC as Model 049-51-26s (BOAC contract LX-21 of 4 April 1946). The last 140 military aircraft under the Lockheed contract were to have been completed as C-69As and C-69Bs, but were cancelled before final assembly had started.

Lockheed used the Airplane Model Designation 49-46-10 for both batches of C-69s. The first group of digits represented the Basic Model Number, and the second group in the Lockheed nomenclature was the Power Plant Identification Number, in this case the Wright Double Cyclone. Rated at 2,200 hp (1641 kW) and having military and normal ratings at 5,000 ft (1524 m) of 2,200 hp (1641 kW) and 2,000 hp (1492 kW), respectively, these 18-cylinder radial engines drove 15-ft 2-in (4.62-m) constant-speed three-bladed propellers. These engines were initially operated as 711C-18BA-1s – R-3350-33s in the military nomenclature – with only their single blower operative, but eventually had their high blower activated for improved altitude performance (as 711C-18BA-2s, or R-3350-35s). Fuel tank capacity was 4,580 US gal (17337 litres) giving a ferry range of 4,600 miles (7403 km) and an operational range of 2,400 miles (3862 km) when carrying 50 passengers (adequate for West Coast to Hawaii flights against prevailing winds). Top speed and cruise speed at 10,000 ft (30480 m) were 330 mph and 300 mph (531 and 483 km/h), respectively. The C-69 climbed to 10,000 ft (30480 m) in 7.1 minutes and its service ceiling was 25,000 ft (7620 m).

The third group of digits in the Lockheed designation was the Interior Arrangement Identification Number. In the case of C-69s, Interior Number 11 provided for an operating crew of five (pilot, co-pilot, flight engineer, and radio operator on the flight deck, and a navigator at a station on the left-hand side).

Opposite the navigator's station, on the right-hand side behind the cockpit, were quarters for a relief crew of four, and a cargo compartment. On the right-hand side of the passenger cabin were 11 four-seat rows, the front row seats facing aft and the seats on the 10 other rows facing forward. Sixteen additional passengers (for a total of 60) were accommodated on four side-facing four-place folding benches. Alternatively, the cabin could be rearranged to accommodate 22 passengers in sleepers. Aft of the main cabin were food lockers and two lavatories. During cruise at 20,000 ft (6096 m), passengers and crew were kept at the comfortable equivalent of 8,000 ft (2438 m) by cabin pressurisation. With this cabin arrangement, maximum payload was 11,000 lb (4990 kg). Empty weight was 48,630 lb (22058 kg) and gross weight was limited to 72,000 lb (32660 kg).

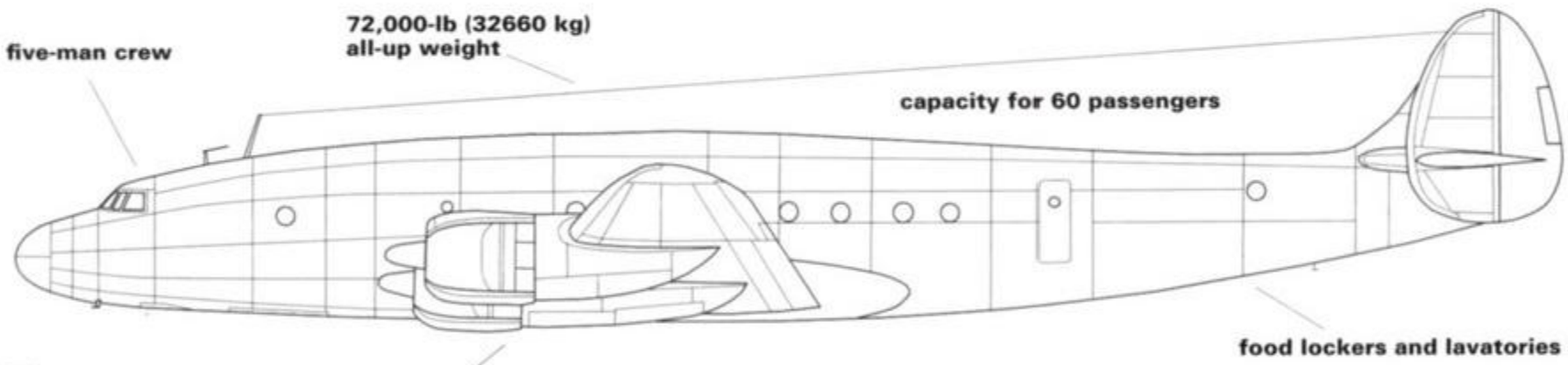
Only a dozen C-69s had been accepted



The pleasing lines of the early Constellation are displayed to good effect in this shot of C-69-1-LO 43-10314. On the rear fuselage is the Army Air Force Air Transport Command (ATC) badge.

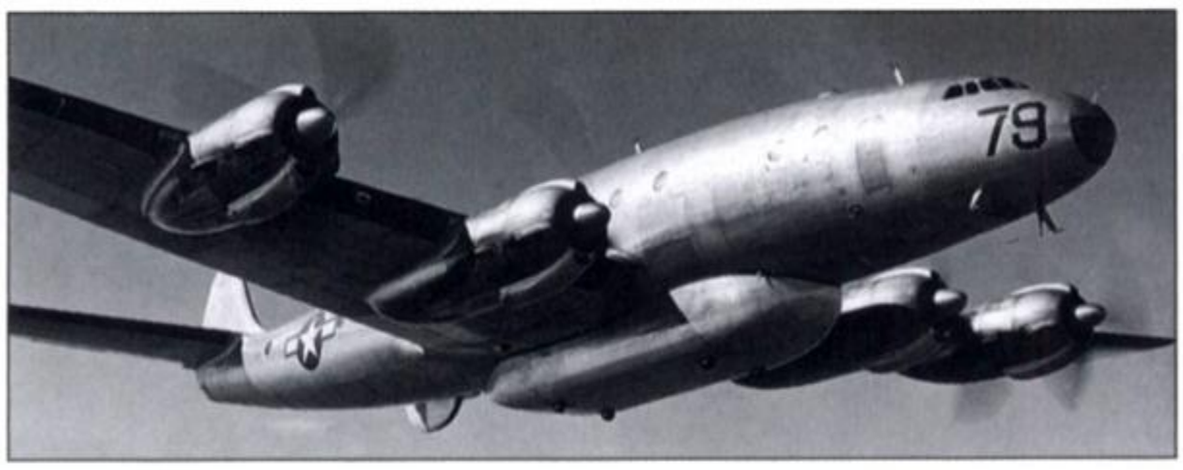
C-69 specification

Span:	123 ft (37.49 m)
Length:	95 ft 2 in (29.01 m)
Height:	23 ft 8 in (7.21 m)
Wing area:	1,650 sq ft (153.29 m²)
Empty weight:	48,630 lb (22058 kg)
Design weight:	50,500 lb (22907 kg)
TO gross weight:	72,000 lb (32659 kg)
Overload weight:	93,000 lb (42185 kg)
Max. fuel capacity:	4,820 US gal (18245 litres)
Max. speed at 10,000 ft (3048 m):	330 mph (531 km/h)
Typical cruise speed at 10,000 ft (3048 m):	300 mph (483 km/h)
Economical cruise speed at 10,000 ft (3050 m):	227 mph (365 km/h)
Climb to 10,000 ft (3048 m):	7 minutes 6 seconds
Service ceiling:	25,000 ft (7620 m)
Normal range with 11,000 lb (4990 kg) payload:	2,400 miles (3862 km)
Ferry range:	4,500 miles (7242 km)


five-man crew
72,000-lb (32660 kg) all-up weight
capacity for 60 passengers
food lockers and lavatories
Wright R-3350-33/-35 Double Cyclone engines

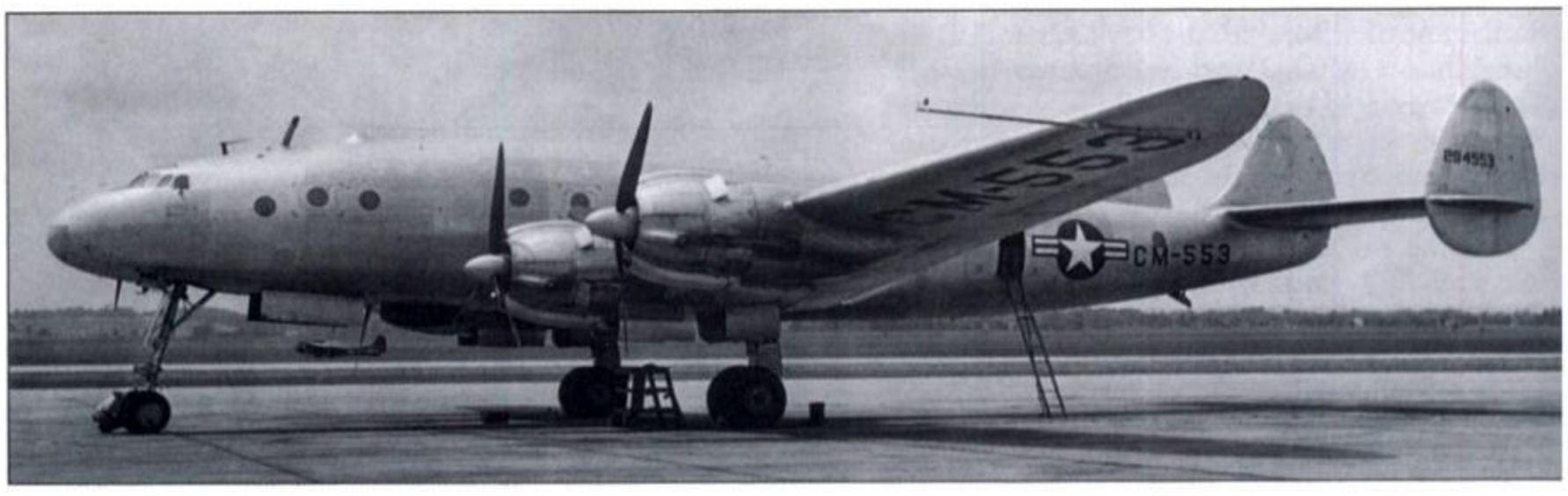
C-69

During August 1945 C-69-5-LO 42-94551 established a speed record of 14 hours 12 minutes covering 3,660 miles (5182 km) between New York and Paris. It is seen after arrival at Orly, Paris.



Above: The Speedpak external cargo container was tested on the last C-69-5-LO, 42-94558. Able to carry just over 4 tons (4.07 tonnes) of freight and nearly doubling the cubic baggage capacity, the Speedpak reduced the type's cruising speed by just 10 mph (16.1 km/h).

Right: The only known use of the 'CM' buzz-code for the C-69 was on C-69-5-LO 42-94553. Before being delivered to the USAAF, the aircraft was used by Lockheed as a demonstrator, finished in Eastern Air Line's colours.



The second C-69 was loaned to TWA, although it retained its Army serial on the tail (43-10310).

by the USAAF before VJ-Day and most were retained for tests and development, so military Constellations saw limited service with the Air Transport Command and did not have an impact on wartime logistics. With the exception of 42-94551, which crashed in Kansas on 18 September 1945, and 42-94552, which was destroyed in static tests at Wright Field, Ohio, all C-69s were rapidly disposed of by the War Assets Administration. Even though these state-of-the-art aircraft were no longer in military service, they received the **ZC-69** designation (the prefix Z meaning obsolete) in paperwork which outlasted them with the government. The C-69s released after the war went into airline service as Model 049s, with gross weight increased to 86,250 lb (39123 kg) and full commercial accommodation.

C-69 serials: C-69-LO: 43-10309/10310 (2)
C-69-1-LO: 42-94549 (1), 43-10311/10317 (7)
C-69-5-LO: 42-94551/94553 (3), 42-94558 (1)
Cancelled: 42-94554/94557 (3), 42-94559/94728 (140)

Note: The above serials do not match those published in numerous books, articles and websites. Notably, most sources have given the serial for the fourth C-69-5-LO as 42-94554. However, official Lockheed and Air Force documents – such as Lockheed Report No. 1650, *Summary of Airplane Model Designations – Lockheed Airplanes* dated 6.7.46, and *Index of AF Serial Numbers Assigned to Aircraft 1958 and Prior* published in April 1961 by the Air Force Procurement Division – do list that aircraft as 42-94558.

Right: 42-94533 was finished in EAL markings as 'NC70000' but flew with TWA before returning to the USAAF.

Below: G-AHEN, from the cancelled batch, would have been serialled 42-94559, but was delivered to BOAC.

C-69A

Whereas the C-69 was essentially a militarised airliner to be used mostly in the personnel transport role, the C-69A was planned from the onset as a military transport. Its full Lockheed Airplane Model Designation Number, 49-46-11, showed that it was to differ from the C-69 only in terms of its interior arrangement. Intended for both troop and cargo transport, the C-69A was to have been fitted with reinforced cabin flooring and an upward-lifting cargo door on the left side of the fuselage, aft of the wing. A smaller, conventionally-opening door was included in the cargo door for personnel boarding, while a ramp and a winch were provided for cargo loading. Gun ports were to have been provided in the cabin windows (as was the case with wartime Curtiss C-46s and Douglas C-47s). Spartan accommodation provided food lockers only for the crew, and for heating and ventilation to be provided primarily in the flight station. Simple toilets and urinals separated from the rear of the main cabin by curtains were to replace the fully-enclosed lavatories of the C-69.

As needs dictated, the C-69A cabin could be rearranged to carry either (1) 100 troops on canvas seats – 26 on each side of the cabin and 48 on back-to-back canvas seats at the centre of the cabin; (2) 40 litter patients; (3) six troops, a 105-mm howitzer and carriage, 30 howitzer rounds, and two ¼-ton trucks; or (4) nine troops, three 37-mm anti-tank guns and carriages, 12 40-round boxes of 37-mm ammunition, and three ¼-ton trucks.

C-69As were to have been built under that part of contract W535 AC-26610 which was cancelled at war's end, and none was completed.

C-69B

Like the C-69A, the C-69B was a military troop/cargo transport which was to have been built under contract W535 AC-26610 but did not proceed past the design phase. Designated Model 349-43-12 by Lockheed, it was to have differed structurally from the C-69A essentially in having the crew entrance door relocated from the right-hand side to the left side. Primarily intended to carry aircraft engines and propellers to B-29 bases in China, the C-69B was to have been fitted with special latching in the cabin to secure these loads. Two-blower R-3350s were to endow this variant with improved high-altitude performance, as required by operations over the 'Hump' between India and China. In addition, fittings and a hoist were to be provided so that a T-9 tank could be carried under the centre-section.

C-69C

The 11th C-69 was completed in 1945 as a Model 549-51-19 and was designated C-69C by the USAAF. It differed from the C-69s in being powered by two-blower R-3350-35A engines and in being fitted as a staff transport. An attendant was added to the crew to cater to the 42 passengers, seating in 11 rows of double airline-type reclining seats on the right side of the cabin and 10 rows of similar seats on the left side. Two compartments for passenger coats and a separate crew lavatory were provided between the cockpit and the main cabin. The designation **ZC-69C** was used for paper work when the aircraft was released back to Lockheed and redelivered to BOAC.

C-69C serial: C-69C-1-LO: 42-94550 (1)

C-69D

The unbuilt C-69D was to have been another staff transport variant with the same accommodation as the C-69C. It was to have been powered by 2,500-hp (1865-kW) advanced R-3350 engines enabling gross weight to be increased from 72,000 to 100,000 lb (32659 to 45360 kg). Fuel and oil tank capacities were to have been boosted for long-range operations, and thermal anti-icing was to have been substituted for the de-icing boots of other C-69 variants.

XC-69E

The first C-69 from the TWA contract (43-10309, below) was re-engined in 1945 with 2,100-hp (1567-kW) Pratt & Whitney R-2800-83 radial engines. At that time it was also retrofitted with the thermal de-icing system under development for the projected C-69D. It was almost immediately released back to Lockheed and was redelivered to Howard Hughes as a Model 049-39-10 in 1946.

Lockheed purchased it back in 1949 and modified it as the Super Constellation prototype. Later, this aircraft served as the aerodynamic prototype for the Navy's PO-2W (WV-2/EC-121K) airborne early warning variant described below. Finally, it was fitted with an Allison 501 turboprop installed in the outer starboard engine nacelle to serve briefly as an engine testbed for the Lockheed Electra.

XC-69E serials: XC-69E-LO: 43-10309 (1 converted from C-69)

Constellation Variants

XB-30

Another unbuilt wartime variant was the XB-30-LO which was designed to meet the same requirements as the Boeing XB-29, Douglas XB-31 and Consolidated XB-32. Retaining the wings and tail surfaces of the Model 49 transport, the Model 249-58-01 was to have had a new fuselage with up to six gun turrets (one in the nose, two above and two below the fuselage, and one in the tail) housing 10 0.50-in guns and one 20-mm cannon. Ventral bomb bays were to accommodate eight 2,000-lb (907-kg) bombs. Proposed with 2,200-hp (1641-kW) Wright R-3350-13s, the XB-30 was to have had a gross weight of 94,000 lb (42638 kg). Performance was estimated to include a top speed of 382 mph at 25,000 ft (615 km/h at 7620 m) and a range of 5,000 miles (8046 km) when carrying 6,000 lb (2722 kg) of bombs.

Awarded a contract to prepare preliminary engineering data on 27 June 1940, Lockheed later opted to withdraw from the heavy bomber competition. Prior to that decision, the design had evolved sufficiently to warrant new Lockheed Airplane Model Designations as the seven-place Model 51-58-01 and the six-place 151-98-01 with different R-3350 models.

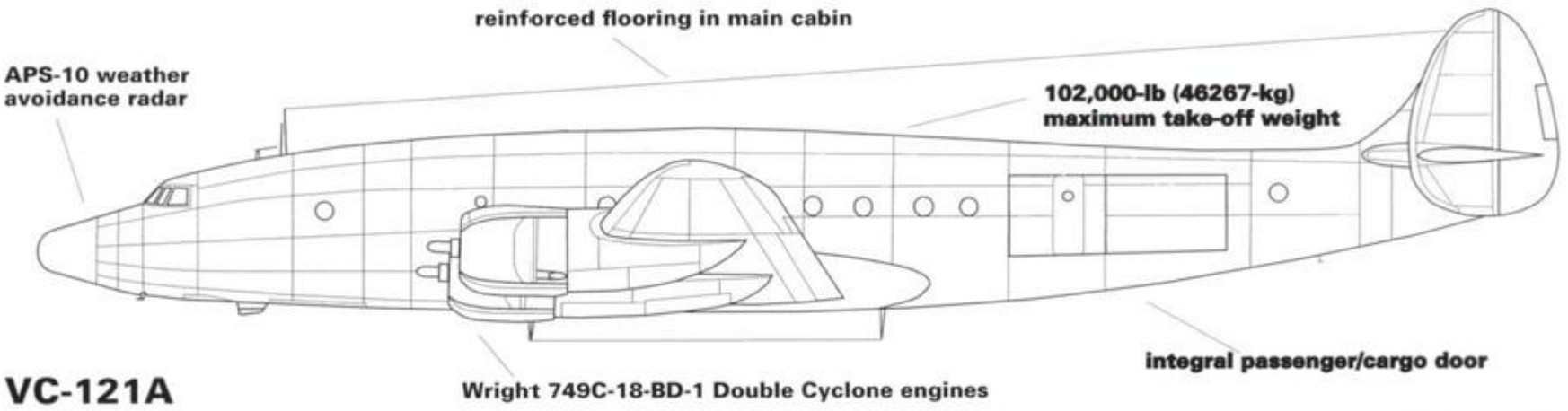
C-121A

Dimensionally similar to the C-69 (with a span of 123 ft/37.49 m and length of 95 ft 2 in/29.01 m), the C-121A was derived from the heavier and more powerful post-war civilian Model 749. Lockheed was awarded contract W33-038 AC-20017 for 10 aircraft on 10 February 1948, and all but one were completed as C-121As (Lockheed Model 749-79-36). Powered by four 2,500-hp (1865-kW) Wright 749C-18-BD-1 Double Cyclone radial engines, the C-121A had a maximum gross take-off weight of 102,000 lb (46267 kg). It had a crew of five (pilot, co-pilot, flight engineer, radio operator and navigator) and provision for a relief crew of four. Galleys and lavatories were located aft of the cockpit and relief crew compartment.

Developed from the all-passenger Model 749 airliner, the C-121A was ordered by the USAF as a cargo/passenger transport. For use in the cargo transport role, the aircraft was fitted with reinforced flooring incorporating cargo tie-down fixtures and a 112-in x 72-in (284-cm x 183-cm) main deck cargo door with integral passenger door on the aft port side. For use in the aeromedical evacuation role, there was provision for the installation of 20 litters and seating for medical attendants. However, the nine C-121As were delivered in staff transport configuration with floor carpet in the main cabin and 44 airline-type seats. In service, six were modified as **VC-121A**s with plusher accommodation. Noteworthy VC-121As were those used by General Dwight D. Eisenhower (48-614 *Columbine* and 48-610 *Columbine II*) and General MacArthur (48-613 *Bataan*).

C-121 serials:
C-121A-LO: 48-609/617 (9)
VC-121A-LO: 48-610/614 (5) and 48-617 (1) converted from C-121As

C-121A 48-612 flew shuttle flights in support of the Berlin airlift with the MATS Atlantic Division before becoming a VC-121A.


reinforced flooring in main cabin
APS-10 weather avoidance radar
102,000-lb (46267-kg) maximum take-off weight
integral passenger/cargo door
Wright 749C-18-BD-1 Double Cyclone engines

VC-121A

Right: VC-121A 48-613 was the first Constellation to be fitted with the nose-mounted APS-10 weather avoidance radar. It served as a VIP transport for Generals MacArthur and Ridgway, and Pacific Command HQ before going to NASA in 1966.

Above: C-121A 48-610 was modified to become a VC-121A and was used by the Secretary of the Air Force, and from late 1952, by President Eisenhower.

Below: Perhaps the best known Constellation in recent years is the ex-Conifair Aviation C-121A budworm sprayer C-GXKO which was later restored (as N494TW) and returned to its former MATS glory and identity (48-609).

VC-121B

The first aircraft ordered under contract W33-038 AC-20017 for C-121As was completed with VIP accommodation and was expected to replace the Douglas VC-118 *Independence* as the next Presidential transport. However, following his 1948 re-election, President Harry Truman chose to continue using *Independence* as his preferred transport aircraft. Nevertheless, the VC-121B became the first aircraft assigned to the 1254th Air Transport Squadron (Special Missions) at Washington National Airport and, later, at Andrews AFB, Maryland.

On delivery, the VC-121B (Lockheed Model 749-79-38) differed from the C-121As in having, from front to rear, (1) galley, coat and baggage compartments just aft of the flight deck; (2) a forward cabin divided by a partition into two sections and provided with four rows of berthable seats; (3) a lavatory and a coat/baggage compartment; (4) a stateroom with two couches (each seating three and convertible into single beds), two swivel seats, a table, a two-place settee, a buffet, a cabinet and a closet; (5) a large coat compartment and a storage area for a life raft; and (6) aft lavatory. Altogether, accommodation was provided for 24 day passengers or 14 night passengers (10 in sleepers and four seating).

VC-121B serial: VC-121B-LO: 48-608 (1)

The VC-121B is seen after being fitted without spinners and with the weather radar modification. It was retired by the USAF in April 1968.

Left: Fewer passenger cabin windows and the deleted port cargo door distinguished the single VC-121B from the C-121As.

Above: Redesignated as a C-121A, '608 carried the flags of the 30 countries visited while the personal transport Secretary of the Air Force Quarles.

PO-1W (WV-1)

Ordered in September 1948 under Navy contract NOa(s)-10028, the two PO-1Ws were the prototypes of the most important military variant of the Constellation/Super Constellation series. Preliminary design work on this variant had begun three months earlier to meet a Navy requirement for an airborne early warning (AEW) aircraft fitted with a full combat information centre (CIC). To house the bulky and heavy AEW and CIC equipment, Lockheed chose to use Model 749 airframes as modified for the USAF C-121As with reinforced flooring and aft cargo door. In addition, their centre fuselage section was modified and strengthened to permit installation of large ventral and dorsal radomes. Like the C-121A and civil 749/749As, the two PO-1Ws were to be powered by four 2,500-hp (1865-kW) Wright 749C-18-BD-1 Double Cyclone radial engines.

For the AEW mission, the PO-1Ws were fitted with an AN/APS-20 search radar with an 8-ft x 3-ft (2.44-m x 0.91-m) quasi-elliptical antenna housed in a bulky radome attached under the fuselage centreline. An AN/APS-45 radar height finder was housed in a dorsal radome, and a nose radome for a weather radar was subsequently added. Supplementing these primary sets were no fewer than 39 antennas, including a small dorsal spine and a variety of spikes and blades, for ECM and ESM equipment. Cabin arrangement provided for an operating crew of 12 (pilot, co-pilot, flight engineer, radio operator, navigator, radar operator, CIC officer and four operators) plus a relief crew of 10 to 16 (including equipment repair technicians). Electronic equipment and operators' stations were accommodated in the main cabin, with additional electronic equipment fitted in these Constellations' belly cargo compartment. Crew safety and comfort amenities included four relief areas (each with four seats facing inboard, convertible into upper and lower berths), galley, wash basin, toilets, coat rack and overhead racks for 22 parachutes.

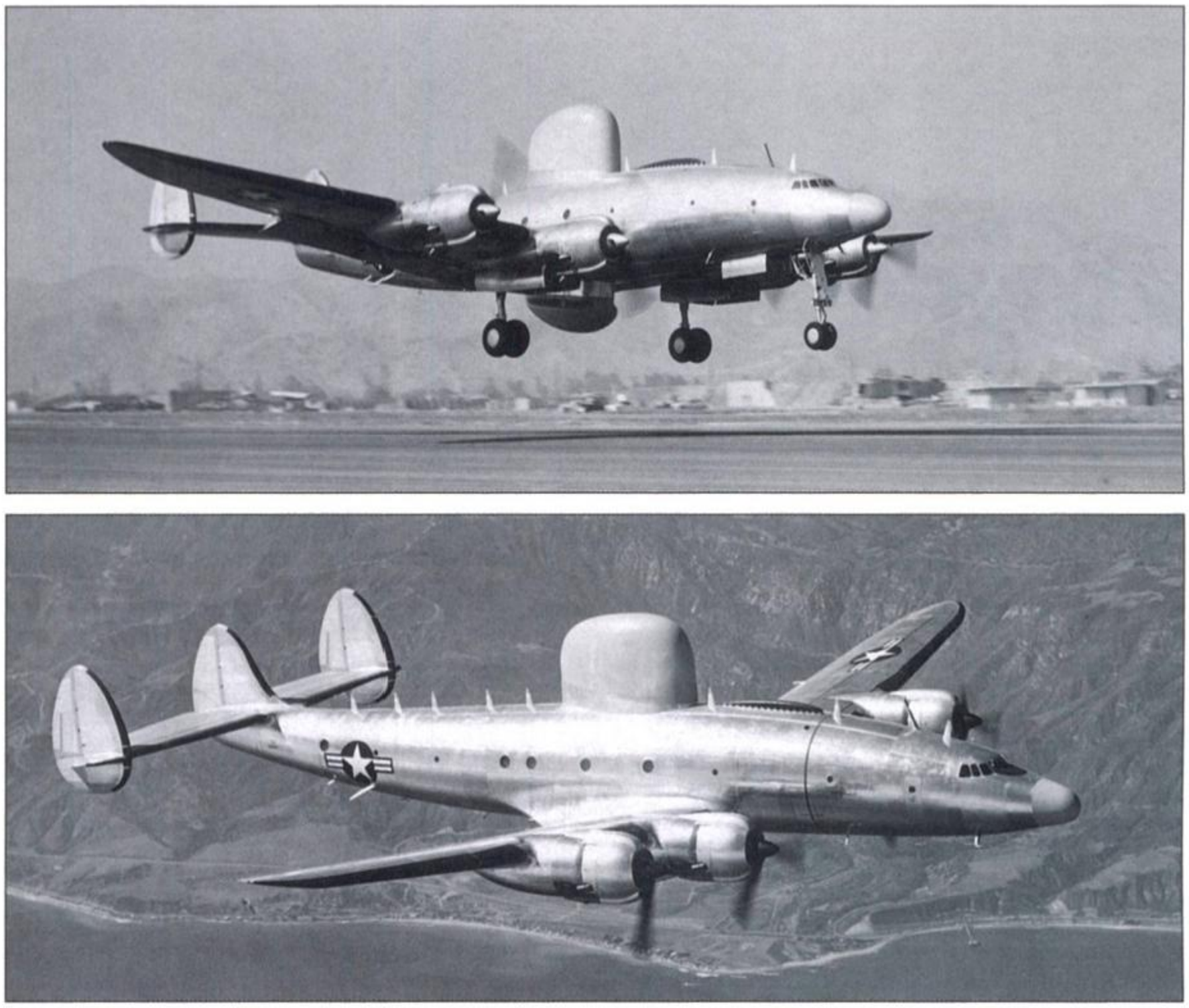
Maximum gross weight was 110,000 lb (49896 kg) and, in spite of the drag of the large radomes, maximum speed was only 3.7 per cent (13 mph, 21 km/h) below that of a clean Model 749. In service, the PO-1Ws were cleared to fly at speed of up to 300 kt (345 mph, 554 km/h) from sea level to 17,000 ft (5182 m). Above 17,000 ft, speed was to be reduced by 5 kt (5.7 mph, 9.2 km/h) for every 1,000 ft (305 m) of altitude, while speed at low altitude was limited to 210 kt (241 mph, 388 km/h) when flying in extremely turbulent air.

The first PO-1W made its two-hour 15-minute maiden flight at Burbank, California, on 9 June 1949. Handling characteristics were little changed from those of 'clean' Constellations except for a directional 'stubbornness' caused by the blanketing of tail surfaces by the huge dorsal radome. Fortunately, this was easily solved by inserting an 18-in (46-cm) section in the two outer fins. These larger outer fins were later made standard for all civil and military Super Constellations and were completed on these aircraft by a taller central fin to bring all vertical surfaces to the same height.

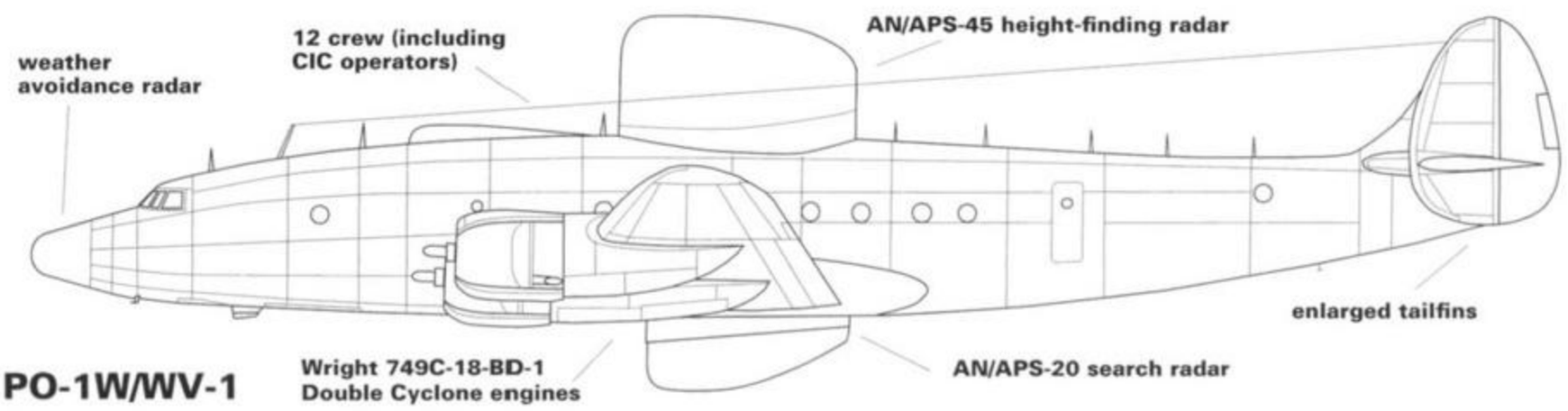
The PO-1Ws were delivered to the Navy in August 1949 (BuNo. 124438) and December 1950 (BuNo. 124437). By the later date, the two aircraft had been redesignated WV-1s. In addition to being operated by the Navy for R&D and tactic development, the WV-1s participated in Navy and NATO exercises in the North Atlantic (Operations Mainbrace, Mariner and Redlight in 1951-52).

After their WV-2 derivatives entered service, the WV-1s were transferred to NAS Jacksonville, Florida, where they were operated in the weather reconnaissance role by the 'Hurricane Hunters' of Airborne Early Warning Squadron Four. Finally, their AEW equipment and radomes were removed prior to transfer to the Federal Aviation Agency.

PO-1W/WV-1 BuNos:
124437 and 124438 (2)



Both PO-1Ws retained a natural metal finish in Navy service. BuNo. 124437 (top) takes to the air on an early flight. The second aircraft (above) was distinguished by its black spinners. Both aircraft are seen shortly after completion and before the fitting of enlarged fins to correct directional 'stubbornness'.



PO-1W/WV-1

Governmental Model 749

Three US military Constellations – a VC-121A and the two WV-1s – were operated for a while with civil registration numbers by government agencies. Aircraft 48-0613, the VC-121A which at one time had been assigned to General MacArthur, went to NASA in June 1966 and was used for scientific experiments and logistic support at the Wallops Flight Facility, Wallops Island, Virginia, and the Goddard Space Flight Center, Greenbelt, Maryland, as NASA 422.

After their AEW radome and equipment had been removed, the two WV-1s went to the Federal Aviation Agency (later Administration) in 1958-59 as support aircraft. They were transferred to the USAF in 1966 and 1960, respectively. No details regarding USAF use of these aircraft is available, but the fact that they remained civil-registered could mean that they served as transports in support of 'black' activities in Nevada.

Abroad, ex-Air France Model 749 Constellations saw service with two French government agencies, and another went to the government of Senegal as a Presidential aircraft. The first of these aircraft was a Model 749 which had been delivered initially to the Mexican airline Aerovias Guest SA as XA-GOQ, then leased by Pan American as NC86520, and then acquired by Air France as F-BAZR in 1949. After its certificate of airworthiness expired in 1952, the aircraft was stored until acquired by CGTM (Compagnie générale des turbo-machines) for conversion as a testbed for engines and icing devices. With CGTM it was given the registration F-ZVMV, the ZMV indicating that it was an aircraft operated by ENSA, France's prestigious aeronautical engineering university. It first flew with a truss-mounted icing rig in December 1963, with a Turboméca Turmo III turboprop pylon-mounted above the centre fuselage in September 1964, and with a General Electric CF700 turbofan in the same position in January 1966, all of these flights being made at the Istres-Le Tubé flight test centre. This testbed was donated to the Musée de l'Air in 1980.

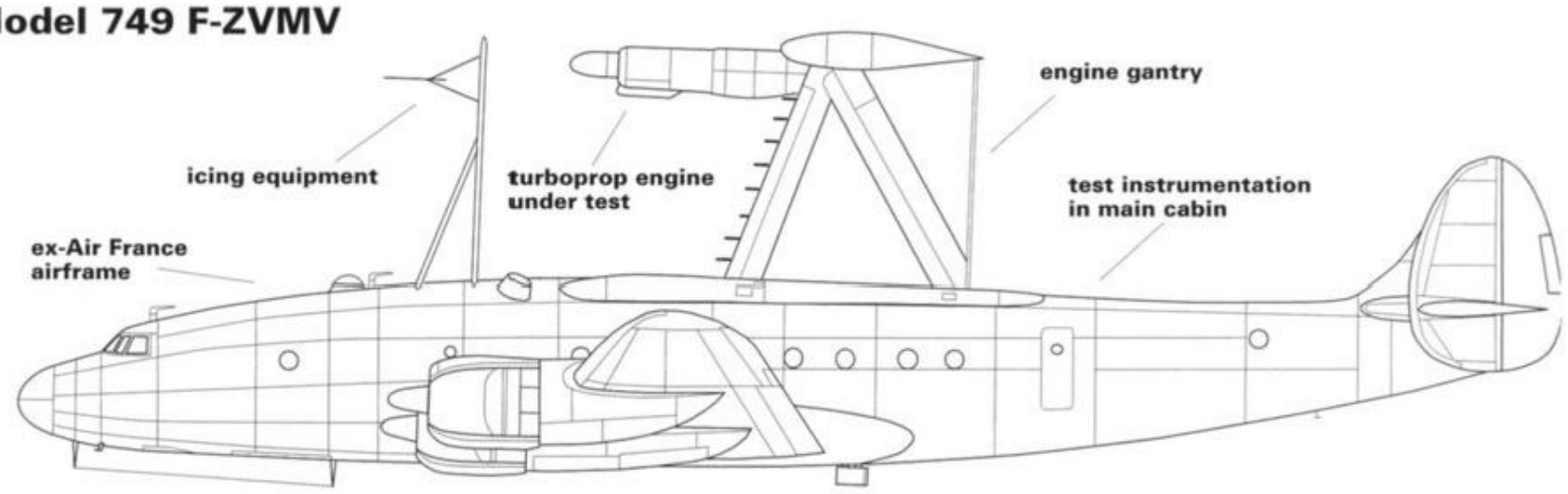
Seven ex-749As were acquired by the SGAC, France's Directorate for Civil Aviation, between 1960 and 1964. Modified as maritime SAR aircraft, they were provided with observation windows and fitted to air drop rafts and emergency supplies. The last four were retired in January 1970.

Another ex-Air France 749A, F-BAZL, was sold to the government of Senegal in March 1966. Registered 6V-AAR and named *Flèche des Almadies*, it was fitted with upgraded accommodation for use by the first elected leader of the newly independent Senegal, President Léopold Senghor. After flying 809 hours in Senegalese service, this aircraft was withdrawn from use in August 1969.

Right: ENSA's engine-testbed was used for 634 test flights during an 11-year career. Among others it tested Astazou and Larzac turbines.

Below: For the last year and a half with EARS 99, F-BAZO was named* Ciel de Guararapes. *Note the SAR blister window behind the cockpit.

Model 749 F-ZVMV



Governmental Model 749 registrations:

NASA: N422NA (1) (ex-USAF VC-121A)
FAA: N119 and N120 (2) (ex-USN WV-1s)
USAF civil-registered aircraft: N1192 and N120 (2) (ex-USN WV-1/FAA Constellations)
French engine testbed: F-ZVMV (1)
French SAR aircraft: F-BAZF, F-BAZJ, F-BAZM, F-BAZO, F-BAZP, F-BAZT and F-BAZY (7)
Senegalese Presidential aircraft: 6V-AAR (1)

Right: Senegal's presidential Model 749A 6V-AAR flew with a seven-man crew. Retired in 1969, the aircraft was broken up in mid-1979.

USN Super Constellation variants

R7O-1 (R7V-1, C-121J)

This transport variant was ordered five weeks after the PO-2W airborne early warning variant – which used the same airframe and powerplant installation and added complex equipment – but was delivered 11 months earlier. Two batches of R7O-1s were ordered under Fiscal Year 1951 contracts: NOa(s) 51-142 dated 18 August 1950 covered 11 aircraft, and NOa(s) 51-655 of 10 February 1951 added 39 aircraft. These naval transport aircraft were redesignated R7V-1s before deliveries commenced in November 1952. Also included in the second contract and assigned BuNo. 131650 was another R7V-1 but, following the issue of a contract amendment dated 18 May 1953, it was completed as a Presidential aircraft and delivered to the USAF as the VC-121E.

Powered by 3,250-hp (2424-kW) Wright R-3350-91 turbo-compound engines, the 50 R7V-1s (Lockheed Model 1049B-55-75s) delivered to the USN were primarily intended for cargo transport. They had reinforced flooring with tie-downs, and cargo loading/unloading was accomplished through two upward-opening main deck doors on the port side of the fuselage, one fore and one aft of the wing, the larger aft door measuring 110 in x 74 in (279 cm x 188 cm). When fitted for military personnel transport, the aircraft could carry up to 106 passengers for overland operations or 97 for overwater operations (space for rafts being necessary). Conversion from overland cargo configuration to overwater passenger configuration could be accomplished in two hours. For aeromedical evacuation, 73 litters

BuNo. 128434 was the first R7V-1 earmarked for the naval contribution to the Military Air Transport Service. Two upward-opening cargo doors were fitted ahead of the rear fuselage 'star and bar' insignia. '434 served all of its Navy service with VR-7 before being transferred to the USAF as 54-4048.

were installed. Standard overwater crew was five (pilot, co-pilot, flight engineer, radio operator and navigator) in cargo configuration and nine (including four cabin attendants) in passenger configuration; accommodation for three relief crew was also provided in either configuration.
Over the years, R7V-1 modifications, inter-service transfers, and a new tri-service nomenclature resulted in numerous redesignations. First, one aircraft was modified to the **R7V-1P** (BuNo. 131624) configuration with cameras for dual use (transport and polar ice pack reconnaissance) by Antarctic Development Squadron Six (VXE-6); the cameras were removed later. Thirty-two were transferred to the USAF as C-121Gs in 1953-54. Next, the ex-R7V-1P and 13 other R7V-1s still in naval transport configuration when the tri-service designation system was adopted in September 1962 became C-121Js in accordance with NAVAIR Instruction 13100.7. Four of these aircraft went on to be modified as NC-121Js (described separately) and another four (BuNos 128443, 131623, 131624 and 131635) became **VC-121J** staff transports with plusher accommodation.

R7O-1/R7V-1 BuNos: 128434/128444 (11), 131621/131629 (9), 131632/131649 (18), 131651/131659 (9) and 140311/140313 (3)

Displaying prominent MATS Pacific Division titles, BuNo 131628 is a VR-8 aircraft.

Right: The 'Blue Angels' used C-121J BuNo. 131623 as its support aircraft between 1968 and late 1970.

***Below right: Seen with other Pacific Missile Range aircraft, C-121J BuNo. 131363 was named* Ole Blue from Point Mugu.**

Below: 'Phoenix', seen in 1963, was the sole R7V-1P used by VXE-6 on Operation Deep Freeze missions.

R7V-2

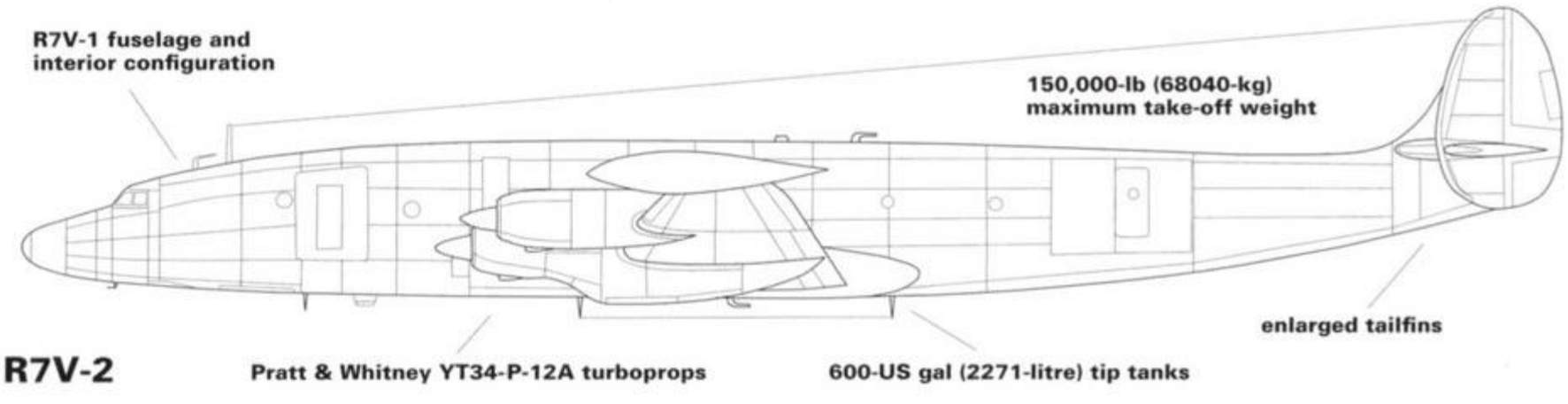
Having been instrumental in the development of the last generation of powerful piston engines with its sponsoring of the Wright Turbo-Cyclone, the Navy also showed much interest in the use of turboprop engines to power transport and maritime patrol aircraft. This led to the second contract for R7O-1s being amended to include the delivery of the last two aircraft (BuNos 131630 and 131631) as turboprop-powered R7V-2s. Two additional R7V-2s were ordered later.

The R7V-2 (Lockheed Model 1249A-95-75) differed from the R7V-1 in having provision for 600-US gal (2271-litre) tip tanks (bringing maximum fuel capacity to a total of 8,750 US gal/33122 litres) and in being powered by four Pratt & Whitney YT34-P-12As driving three-bladed, full-feathering propellers. At sea level on a 15°C/59°F standard day, each of these turboprops generated 5,005 shaft hp (3734 kW) plus 1,360 lb st (6.05 kN) for a total of 5,550 ehp (4140 ekW). As indicated by Interior Arrangement Identification Number 75, the same as that of the R7V-1, the R7V-2 was configured like the piston-engined variant. Initially, however, test equipment filled much of the cabin. Design take-off weight was increased to 150,000 lb (68040 kg) and maximum overload take-off weight was 169,800 lb (77021 kg). The turboprop-powered R7V-2 cruised at 410 mph (660 km/h), a remarkable 60 per cent faster than the piston-engined R7V-1 (and even 45 per cent faster than the turboprop-powered Bristol Britannia 310).

The R7V-2 was first flown on 1 September 1954 and, not ordered into production, was used by the Navy primarily to obtain experience with turboprop operations. The fourth aircraft (BuNo. 131661) was bailed back by Lockheed and was modified by Rohr to serve as a testbed for the Allison 501 propeller-turbines selected to power the Lockheed Electra (and later, as the T56, its naval derivative, the P-3 Orion). Called *Elation*, this aircraft was later re-engined with T34-P-6s and transferred to the USAF. In Air Force service, this aircraft and the similarly re-engined third R7V-2 were redesignated YC-121F-LOs.

The prototype R7V-2 is seen at Burbank prior to its first flight. Note the lack of tip tanks and the Hamilton Standard propellers, with 15-ft (4.6-m) 'paddle' blades, powered by YT34 turboprops.

R7V-2 BuNos: 131630/131631 (2) and 131660/131661 (2)



Above: During testing this unidentified R7V-2 was flown at 479 mph (771 km/h) in a rapid descent. The variant also set a Super Constellation weight record, flying at 166,400 lb (75477 kg) all-up.

Right: BuNo. 131661 was bailed back to Lockheed to test the Allison 501 turboprop, later adopted for the L-188 Electra. The Allison installation itself was carried out by Rohr. The aircraft later became a YC-121F.

PO-2W (WV-2, EC-121K)

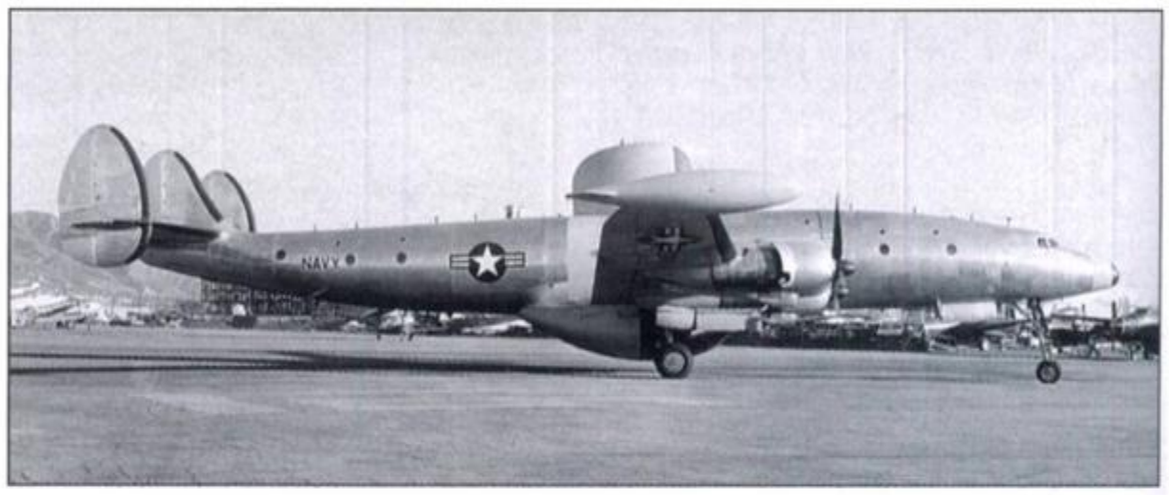
Thirteen months after the first flight of a PO-1W with Constellation airframe, the Navy placed an initial order for six PO-2W aircraft – then termed Patrol Landplane (Special Search) – with Super Constellation airframes. The NOa(s) 51-025 contract for these aircraft was dated 14 July 1950. Subsequent contracts led to the manufacture of no fewer than 142 WV-2s (as these aircraft were redesignated before they first flew in June 1953). In accordance with NAVAIR Instruction 13100.7, most were given tri-service EC-121K designations in September 1962.

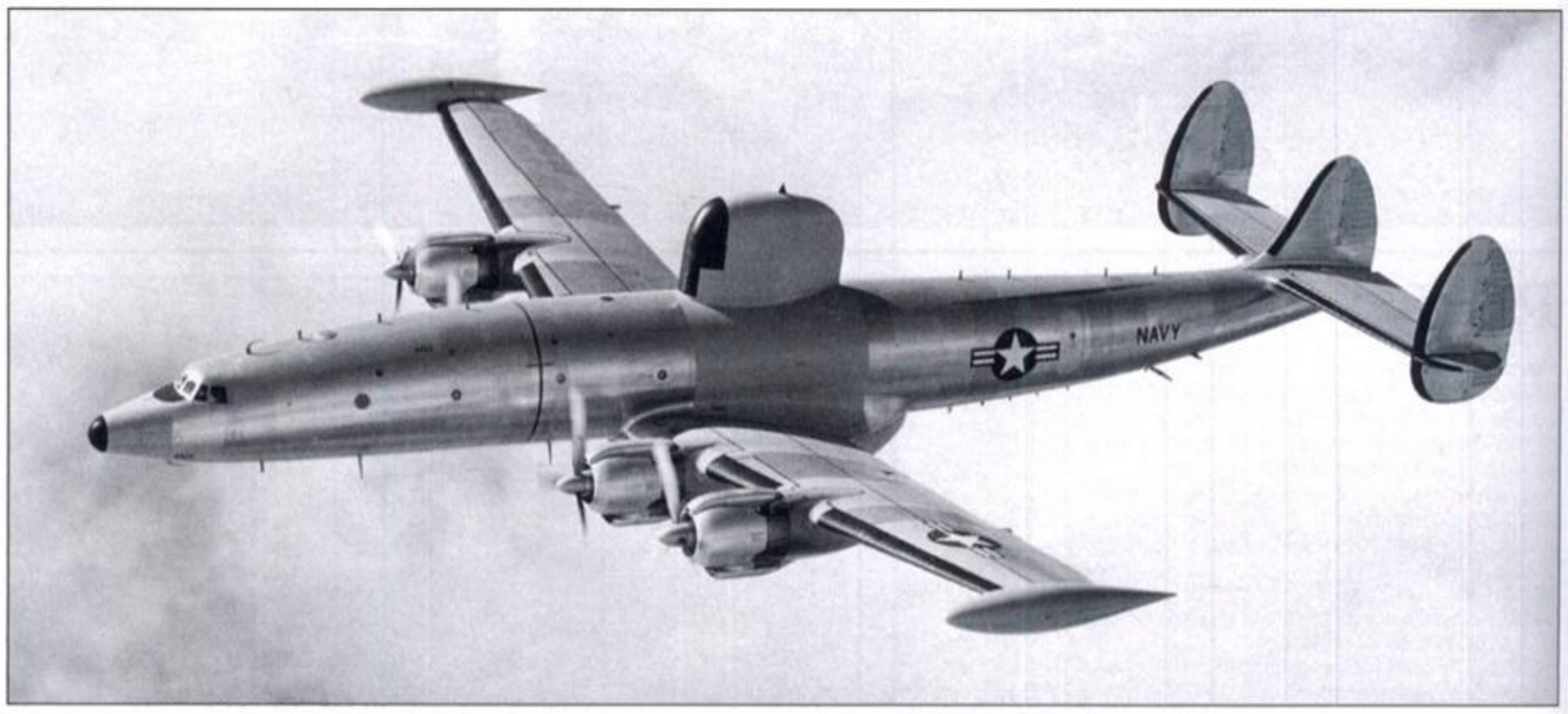
The greater cabin dimensions of the Super Constellation (length of 83 ft 2 in/ 25.35 m versus 64 ft 9 in/19.74 m for the Constellation, floor area of 744 sq ft/69.12 m^2 versus 561 sq ft/52.12 m^2, and volume of 4,875 cu ft/138.05 m^3 versus 3,000 cu ft/84.95 m^3) enabled Lockheed to configure the WV-2/EC-121K more effectively. Initial production Model 1049A-55-70s had three four-place seat-bunks (each convertible to upper and lower bunks), two tables, four benches, a coat closet, a galley unit, a locker, and a toilet compartment in their main crew area forward of the wings. Their CIC compartment extended from just forward of the wings to aft of the wings and had stations for a navigator, a radio operator, two ECM operators, an HF operator, a plotter, an assistant combat information control officer (ACICO), a combat information control officer (CICO), and four airborne control officers (ACOs). Aft of the CIC compartment was another crew rest area with a three-tiered bunk, a convertible seat-bunk with a table, a two-tiered bunk, a toilet, and a urinal. Altogether, standard crew numbered 28 (16 active and 12 relief) but five additional crew members were added for long-duration missions.

Late production WV-2s/EC-121Ks had revised Interior Arrangement Identification Numbers: 86 for aircraft with table, benches and seat-bunks in the forward crew area replaced by fixed overhead bunks over double sleeperette chairs; 91 for aircraft with further changes in the forward crew compartment and additional ditching stations; and 127 for the last batch of aircraft in which more automated electronic equipment enabled normal crew size to be reduced from 28 to 24.

Right: Taxiing in front of a line up of factory fresh P2Vs at Burbank, the first production WV-2 (BuNo. 126512) displays the prominent dorsal and ventral radomes that distinguished the Warning Stars.

Below: With the Lockheed construction number visible on its upper front fuselage and nose, BuNo. 141298 is seen prior to delivery to VW-13 in July 1956.





WV-2s were initially powered by 3,250-hp (2424-kW) Wright R-3350-34s but these turbo-compound radial engines were later upgraded to 3,400-hp (2536-kW) R-3350-42 standard. For long-duration missions, the standard internal fuel tank arrangement of the civilian Super Constellation was supplemented by two fuselage tanks beneath the main deck and 600-US gal (2271-litre) tip tanks for a total capacity of 8,750 US gal (33122 litres). That fuel load resulted in a maximum time on station of nine hours when operating 1,000 nm (1,150 miles, 1852 km) from base and a ferry range of 3,850 nm (4,428 miles, 7125 km). Maximum speed was 292 kt (335 mph, 540 km/h) at 19,500 ft (5945 m), typical combat speed was 275 kt (316 mph, 508 km/h) at 10,000 ft (30480 m), and average cruising speed was 210 kt (24 mph, 388 km/h).

For ease of loading and unloading of the AEW and CIC equipment weighing some 12,000 lb (5443 kg), all WV-2s/EC-121Ks retained the upward-hinged aft cargo door of the R7V-1s/C-121Js. Their main radar sets – AN/APS-20 search in the ventral radome which had a length of 29 ft (8.84 m) and a maximum width of 19 ft (5.79 m), and AN/APS-45 height finder in the 8-ft (2.44-m) tall dorsal radome – were complemented by IFF interrogator, UHF direction finder, ECM receiver, ECM signal analyser and numerous other electronic sets.

Of the 142 WV-2s delivered by Lockheed from October 1955, at least 123 were redesignated EC-121Ks in September 1962, though they retained the 'Willy Victor' nickname derived from their earlier designation. Post-delivery modifications resulted in BuNo. 128324 successively becoming a YEC-121K, an NEC-121K and an NC-121K; six becoming NC-121Ks; 11 being modified as WV-2Qs/EC-121Ms; 12 ending up as WV-3/WC-121Ns; and 22 being upgraded as EC-121Ps. One was

WV-2 BuNo. 141293 carries the 'MK' code adopted by VW-13 around 1960. Typical USN AEW unit strength at this time was 12 WV-2s and a single R7V-1 transport.

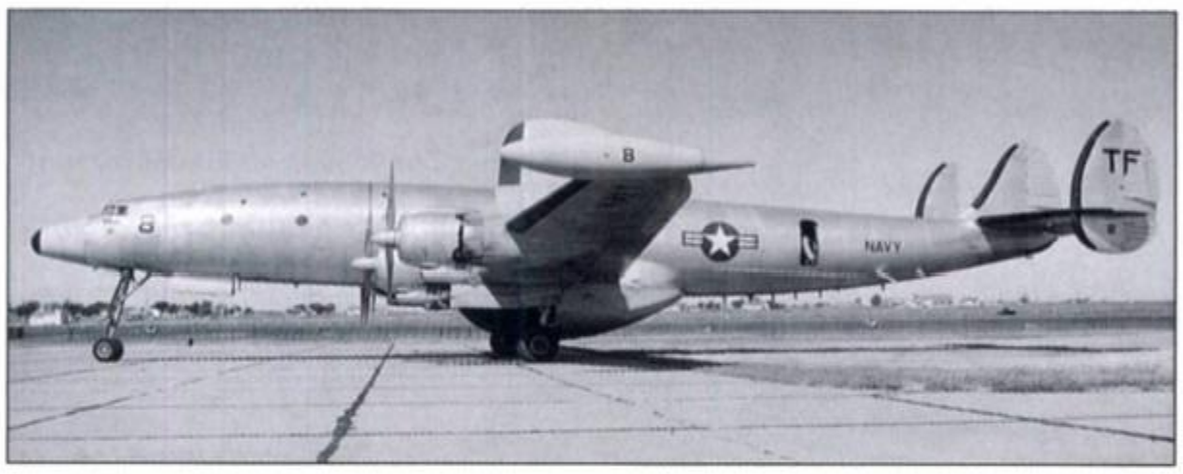
This WV-2 is finished in the original all-over 'seaplane grey' scheme carried by the WV-2 fleet at the time of its introduction. Tip tanks were a standard feature of the variant.

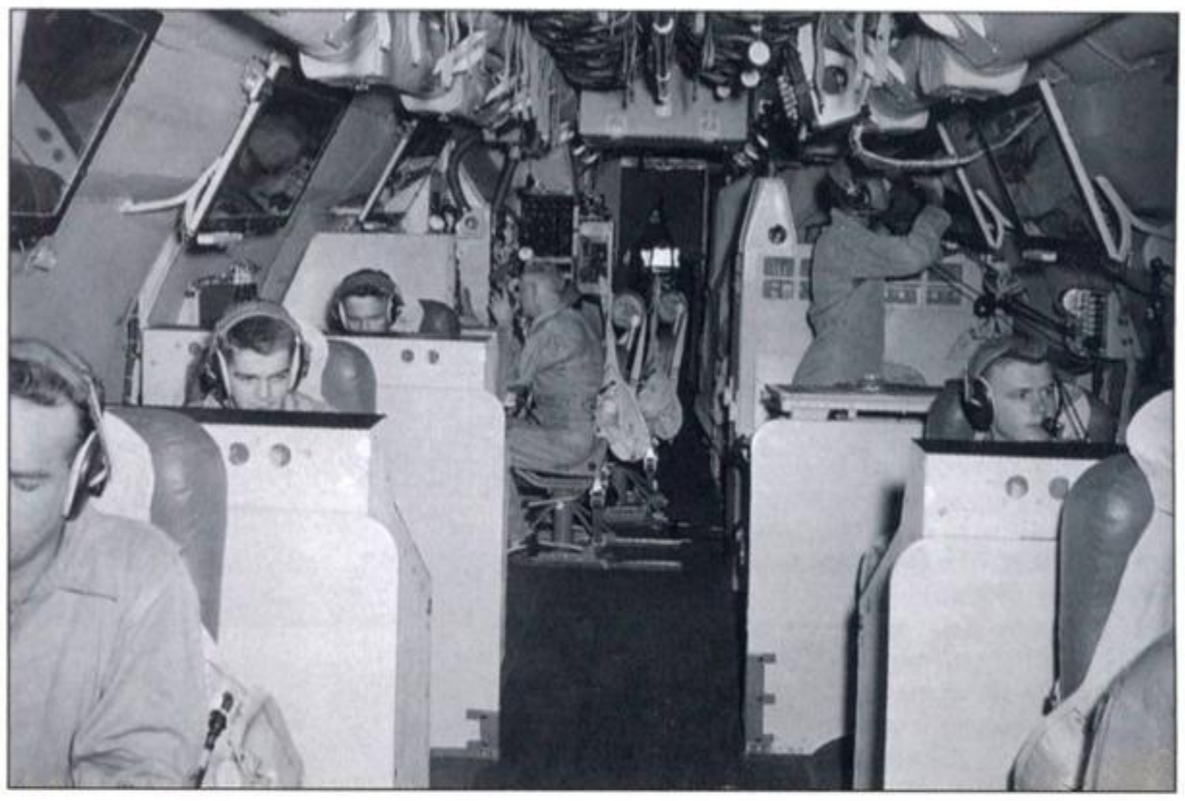
transferred to the US Army as a JC-121K. Thirty-five went to the USAF as NC-121Ds (one aircraft), EC-121Hs (seven aircraft) and EC-121Rs (27 aircraft), and were given Air Force serial numbers. Two retained their EC-121K designation after being transferred to the NASA Lewis Research Center in Ohio but were civil-registered as N670NA and N671NA.

Fitted with four Comint stations, an EC-121K underwent Rivet Top evaluation with the Air Force under combat conditions in Southeast Asia between 23 July and 15 December 1967. These Comint stations proved invaluable, leading to their incorporation in Air Force EC-121Ts.

The last 'Willy Victors' operated in their intended AEW role were some of the EC-121Ks upgraded as EC-121Ps, which flew their last mission with Airborne Early Warning Squadron Eleven (VW-11) in August 1965. The last pair of EC-121Ks with the Navy was operated as range surveillance aircraft by the Pacific Missile Test Center (PMTC) at NAS Point Mugu, California, until May 1970.

PO-2W/WV-2 (EC-121K) BuNos:
126512/126513 (2), 128323/128326 (4), 131387/131392 (6), 135746/135761 (16), 137887/137890 (4), 141289/141333 (45), 143184/143230 (47) and 145924/145941 (18) [cancelled], 131393/131399 (7) and 145942/145956 (15)]





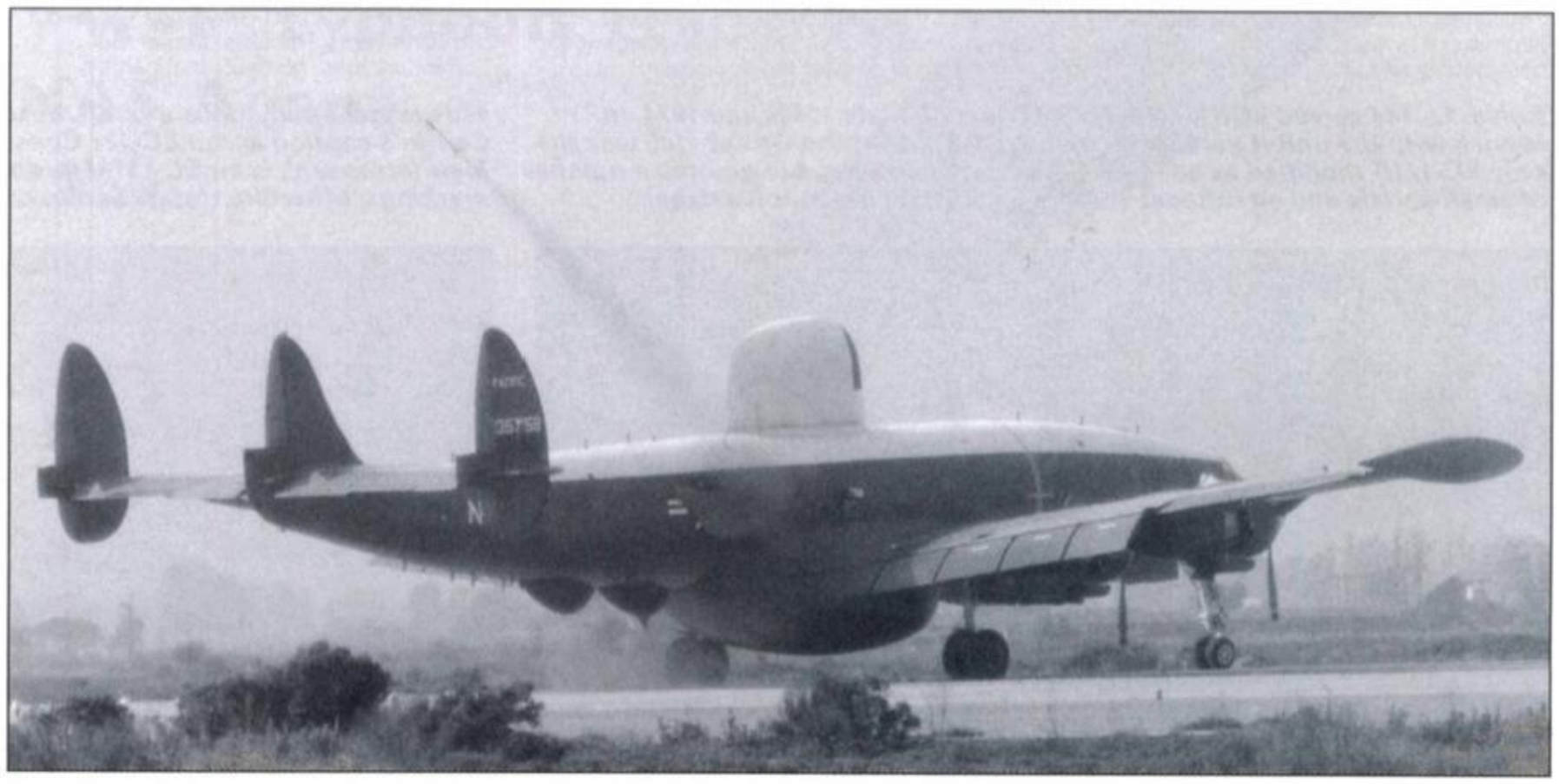
Left: Seen shortly after delivery, BuNo. 135761 'TF/8' Thor, was delivered to the USN on 1 March 1955 and allocated to VW-2 at Patuxent River.

Above: Viewed from the rear of a 'Willy Victor', the Combat Information Center (CIC) was the heart of the WV-2. Parachute packs are stored along the cabin roof.

Above: BuNo. 141311 carries the fin badge of the Pacific Missile Test Center (PMTC). Retired to Davis-Monthan AFB in May 1979, it was later displayed at Chanute AFB.

Above right: BuNo. 141311 served with the Pacific Missile Range's Range Operations Department for 13 years from early 1962. Modified with four extra radomes (two above the forward fuselage and two below the rear fuselage) it operated from Kaneohe, Hawaii, from 1967 until 1973, after which the extra radomes were removed.

Right: Pacific Missile Range EC-121K BuNo. 135758 fires a rocketsonde from a pack on the starboard side of the rear fuselage. These devices were used to transmit weather data back to the aircraft. Note that this aircraft carries a single pair of extra antennas under the rear fuselage. The last two EC-121Ks were retired in 1979.



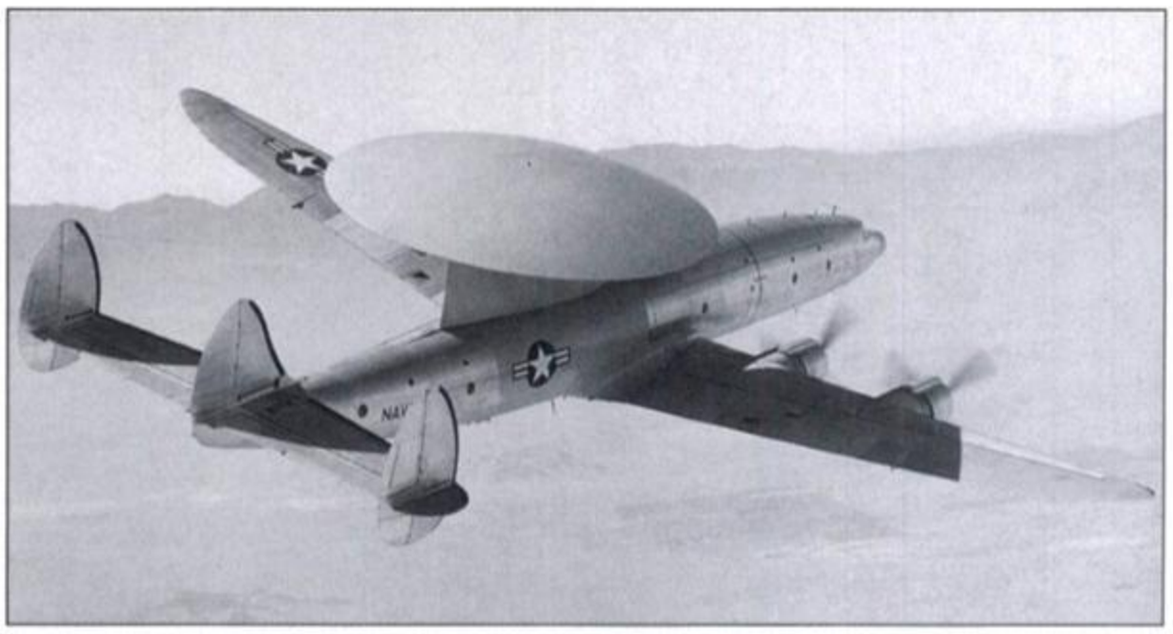
WV-2E (EC-121L)

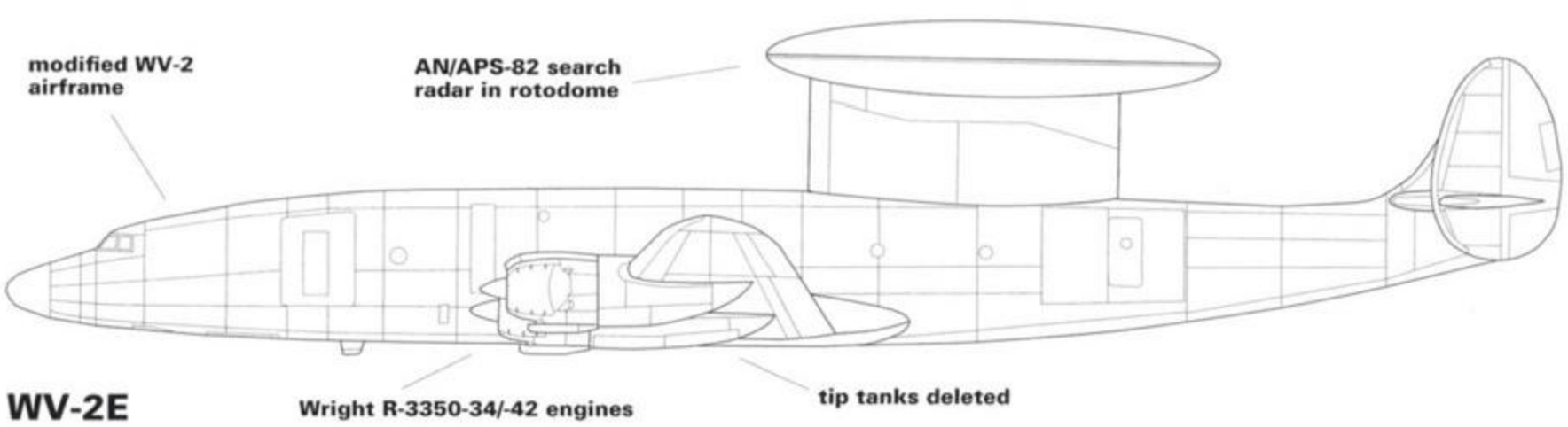
Development of the rotodome concept evolved from work at the Naval Research Laboratory (NRL) during which it was determined that ultra-high frequency (UHF) was the optimum band for detecting aircraft operating in sea clutter. It was also established that an end fire antenna housed in a thin ellipsoidal radome would provide a low cross-section and thus contribute to lift. As the size of the proposed rotodome was considered too large for mounting on an aircraft, the Navy initially intended to mount the new radar on modified N-series Goodyear airborne early warning blimps. In January 1954, however, Lockheed began design work to modify the first WV-2 into a testbed for the AN/APS-82 search radar and its 17-ft 6-in (5.33-m) rotating antenna.

Initially designated WV-2E, the modified aircraft had both its search radar and height finding radar and their associated ventral and dorsal radomes removed. The rotodome housing the antenna for the AN/APS-82 was mounted on an aerodynamic fairing atop the centre fuselage. So modified, the aircraft first flew again on 8 August 1956. During the course of 78 flights totalling 98.81 hours, Lockheed collected useful data for the proposed AN/APS-82 installation in the W2V-1 then under development. Seven months after the cancellation of the W2V-1 contract, the WV-2E was accepted by the Navy and was assigned to the Naval Air Development Unit at NAS South Weymouth, Massachusetts. Redesignated EC-121L in September 1962, this testbed ended up at MASDC.

WV-2E/EC-121L BuNos:
126512 (1 modified from first WV-2)

Above: The resemblance of the aircraft's rotodome to a 'flying saucer' was not, apparently, lost on Lockheed personnel. This company photograph even includes a Martian!





WV-2E

Above: The Naval Air Development Unit was tasked with the development of equipment for anti-submarine warfare and air defence. WV-2E BuNo. 126512, coded '2', was on the unit's strength between March 1958 and July 1959.

Top: The radome containing the AN/APS-82 radar weighed some 9 tons (9.14 tonnes) but was of a far more aerodynamically efficient design to the radomes housing the twin radar sets installed in the WV-2.

WV-2Q (EC-121M)

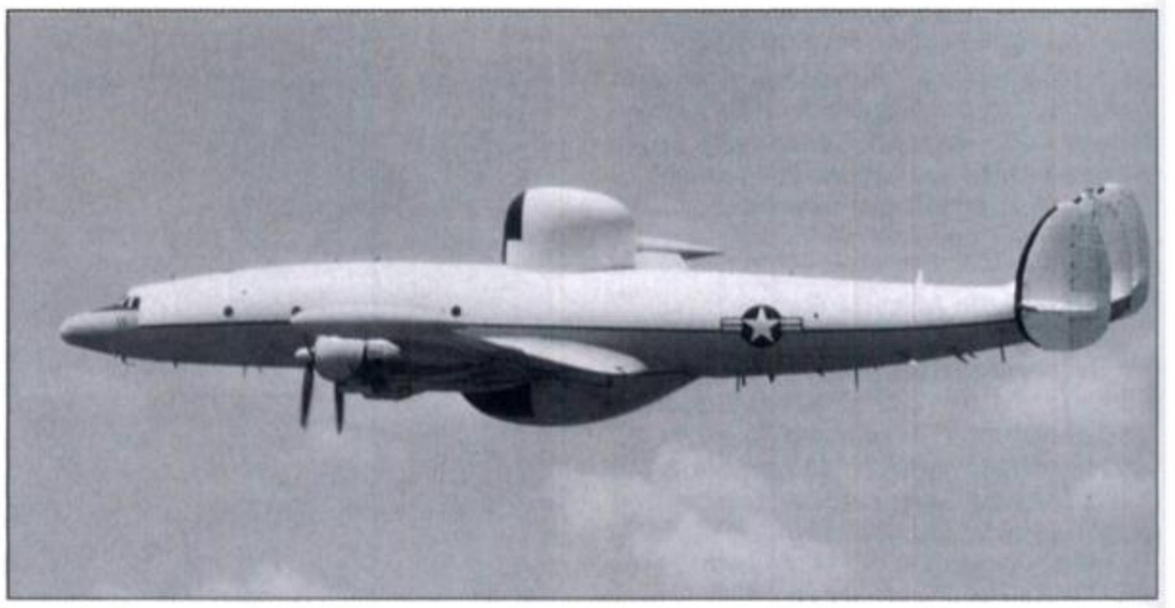
An initial batch of eight WV-2s was converted to the WV-2Q Comint/Elint/Sigint configuration by the Glenn L. Martin Company in Baltimore, Maryland, in 1958-59 to replace the Martin P4M-1Q Mercators in service with Fleet Air Reconnaissance Squadrons One and Two (VQ-1 and VQ-2). A ninth aircraft was added before the designation was changed to EC-121M in September 1962. Subsequently, a 10th and 11th were modified by the Navy from EC-121K and EC-121P airframes.

The WV-2Qs/EC-121Ms retained the AN/APS-20 search radar and AN/APS-45 height finding radar of the WV-2s, as well as most of their CIC installation. In addition, they were fitted with extra work stations for operators of specialised equipment (including AN/ALD-1 direction finder, AN/ALR-3 radar warning receiver, AN/APA-74 pulse analyser, and AN/APR-9 and AN/APR-13 Elint receivers), sprouted numerous additional antennas, and had an auxiliary power unit in the aft fuselage with exhaust on the starboard side of the rear fuselage. Significant improvements were incorporated over the years under programmes such as Gray Shoe, Brigand and Rivet Gym. The latter added four Comint stations, normally manned by language specialists from the National Security Agency (NSA), to monitor hostile communications.

WV-2Q (EC-121M) BuNos:
131390/131392, 135747, 135749, 131751/131752, 131757, and 143209 (9 modified from WV-2/EC-121K airframes) plus 143186 (1 modified from EC-121K) and 145940 (1 modified from EC-121P)

BuNo. 143186 served VQ-1 as 'PR/27' between the late 1960s and 1974. In service with the unit it gained the name* Al's Pearl of the Orient. *'186 was the only EC-121K modified as an -121M, losing its tip-tanks, but gaining a number of small aerials and an exhaust vent for an APU on the rear fuselage.

This rather anonymous aircraft, described in the Naval Photographic Center's caption as 'an EC-121 Constellation cargo transport [over the] Mediterranean', is an EC-121M, probably assigned to VQ-2. Its only markings, other than 'stars and bars' is an '11' under the cockpit.



WC-121N conversion
BuNo. 145935 was assigned to VW-1 in May 1958 (as a WV-2/EC-121K) and remained with the unit after its conversion to WC-121N standard until disestablishment in 1971.

Fuel capacity
The twin 600-US gal (2271-litre) tip tanks weighed 3,900 lb (1769 kg) loaded and were originally designed to improve the range of the turbine-powered R7V variants.

Colour scheme
In common with other US Navy Warning Stars of the period, this aircraft was finished in Seaplane Grey overall, with an Insignia White cabin roof and upper radome. The latter was introduced in an attempt to reduce the effects of heat on the aircraft's internal equipment and crew.

Radar sets
Modified from the basic EC-121K AEW platform, the WC-121N retained the AN/APS-20 search and AN/APS-45 height-finding radar sets fitted to the former. The same basic radar equipment was fitted to the USAF's RC-121C/D aircraft, though the APS-20 gave way to the APS-95 in the early 1960s.

Weather reconnaissance
VW-1's WC-121Ns provided vital data on wind intensity and storm location to ships of the 7th Fleet. Often flown at night, a typical storm penetration flight lasted up to 16 hours, with up to six or seven hours spent in or near a storm, cruising at 180 kts (207 mph; 334 km/h) about 500 ft (152 m) above the ocean. CICOs (Combat Information Center Officers) provided radar vectors from the picture on their radar scopes, while meteorologists gathered other useful data on the storm's characteristics. Neither VW-1 nor VW-4 'Hurricane Hunters' (VW-1's Atlantic Fleet counterpart) lost a single aircraft during the 17 years that these hazardous operations were flown by Super Constellations, though one aircraft is known to have had a close call when it returned to Guam with a tiptank and 3 ft (0.91 m) of wing missing and a severely damaged rear fuselage.

Airborne Early Warning Squadron One (VW-1) was formed to provide heavy AEW support and weather reconnaissance/typhoon tracking for the US 7th Fleet and was initially based at NAS Barbers Point, Hawaii. Equipped with WV-2s from 1954, the unit moved to NAS Moffett, California, in 1956, before another reassignment across the Pacific to NAS Agana, Guam in 1957. Here VW-1 remained until disestablishment in July 1971, though operational and training flights took VW-1 aircraft all over the Pacific region. Between 1965 and 1971 combat support missions for ships on Yankee Station were flown out of Da Nang, South Vietnam, by VW-1 aircraft, including BuNo. 145935, *W.W.I "Ace"*, which flew the last of these sorties on 1 February 1971. For the remainder of its career the squadron operated 10 EC-121K/P and WC-121N aircraft out of Agana and NAS Point Mugu, California.

Lockheed WC-121N Warning Star VW-1 'Typhoon Trackers' NAS Agana 1969

Mission equipment
Though based on the WV-2/EC-121K, the WV-3/WC-121N differed from the AEW variant in sporting a number of mission specific items of equipment, including a vortex thermometer, a psychrometer, a flight recorder, icing rate meters, and radiosondes.

WV-3 (WC-121N)

Externally identical to the WV-2s/EC-121Ks, the WV-3s (redesignated WC-121Ns in September 1962) were initially optimised for weather reconnaissance and, more specifically, for hurricane/typhoon patrol. Eight were delivered new as WV-3s by Lockheed and 12 were converted later from EC-121K and EC-121P airframes. Powered by R-3350-34 engines, the new-built WV-3s (Lockheed Model 1049A-55-95s) had provision for the CIC equipment of the WV-2s but were fitted out for their weather mission with tailored work stations. Crew numbers were normally limited to 11 but accommodation was provided for up to 26, including relief personnel. Mission specific equipment included a vortex thermometer, a psychrometer, a flight recorder, icing rate meters, and radiosondes.

During the war in Southeast Asia, WC-121Ns were also operated by VQ-1 for combat weather reconnaissance and electronic surveillance.

WV-3 (WC-121N) BuNos:
137891/137898 (8 new built); 141323, 141331, 145929 and 145931/145935 (8 converted from WV-2/EC-121K airframes); and 143198, 143205, 145938 and 145941 (4 converted from EC-121P airframes)

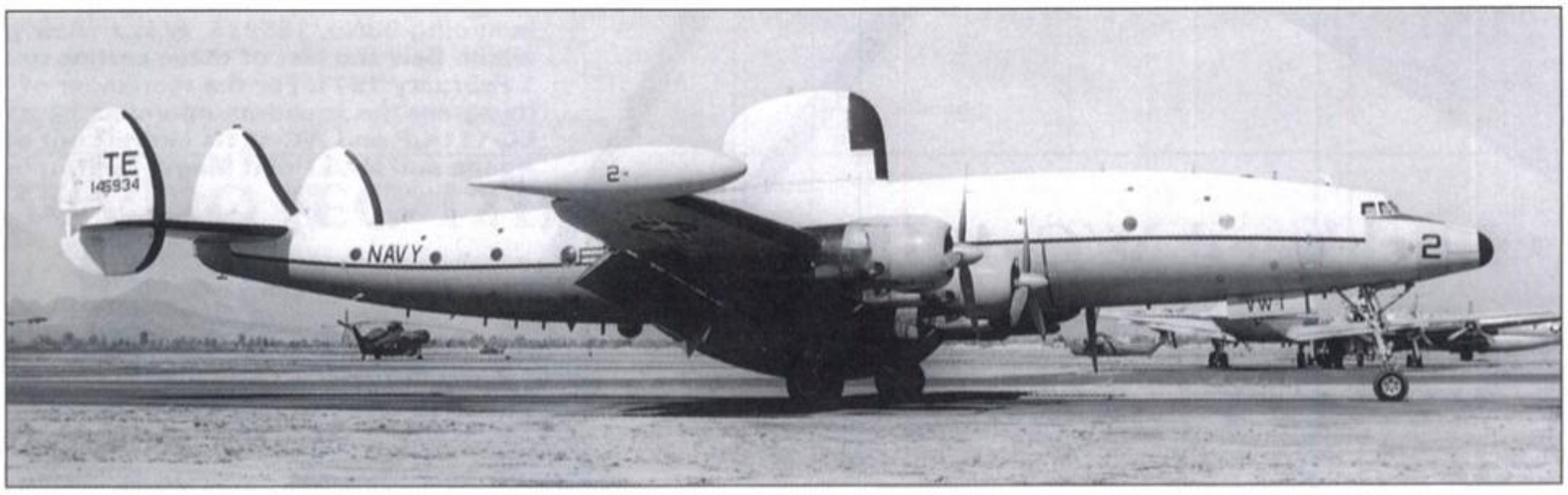
Dora *was converted from EC-121P BuNo. 143198 to weather reconnaissance WC-121N standard. It is seen late in its career with VW-4, probably in the late 1960s, coded 'MH/1'. '198 was struck off in 1973.*

WV-3 specification

Span:	126 ft 2 in (38.46 m)
Length:	116 ft 2 in (35.41 m)
Height:	27 ft (8.23 m)
Wing area:	1,650 sq ft (153.29 m²)
Empty weight:	81,961 lb (37177 kg)
Combat weight:	123,700 lb (56110 kg)
TO gross weight:	144,900 lb (65727 kg)
Max. fuel capacity:	8,750 US gal (33122 litres)
Max. speed at 19,100 ft (5822 m):	313 mph (504 km/h)
Max. speed at sea level:	279 mph (449 km/h)
Typical cruise speed at 10,000 ft (3048 m):	244 mph (393 km/h)
Climb to 10,000 ft (3048 m):	14 minutes 24 seconds
Service ceiling:	19,200 ft (5852 m)
Combat range at 10,000 ft (3048 m):	4,360 miles (7017 km)
Time on station at 10,000 ft (3048 m) and 1,150 miles (1851 km) from base:	9 hours 24 minutes

Above: This WC-121N of VW-4 displays the 'Hurricane Hunters' badge and 'hurricane eye' emblem.

Right: BuNo. 145935, the subject of the artwork on page 129, is seen in June 1969 at NAS Barbers Point.

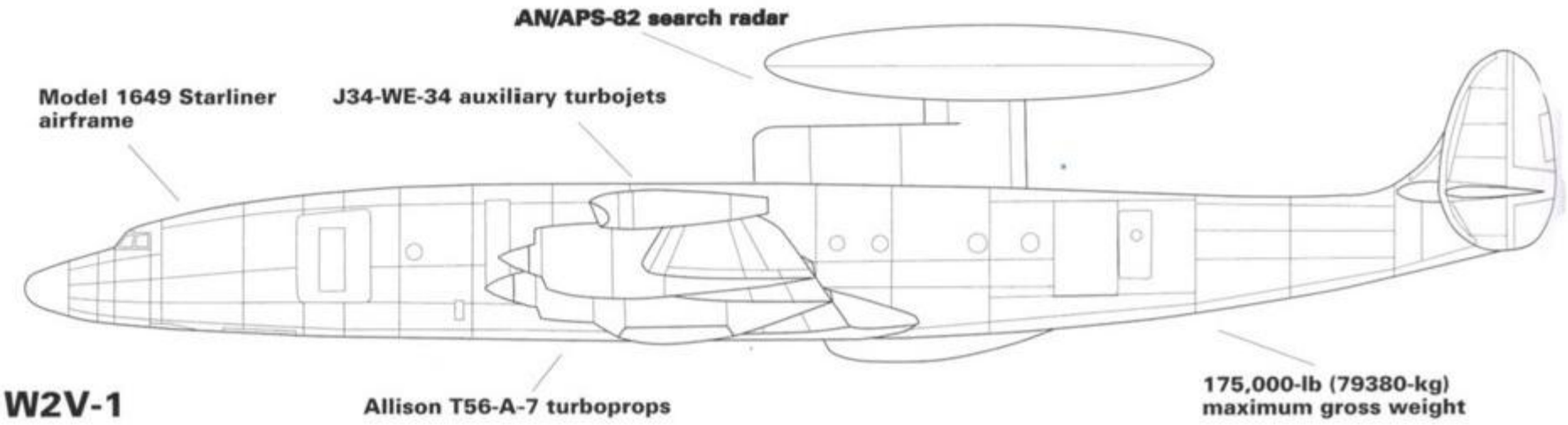


Left: The service career of WV-2 BuNo. 145934 was perhaps a typical, if uneventful, one. Accepted by the Navy on 25 February 1958 and delivered to VW-1 at Agana, Guam, in May, the aircraft was redesignated as an EC-121K in 1962 and converted to WC-121N standard in May 1967. Remaining with VW-1, coded 'TE/2' and named* Draggin Lady, *'934 was finally retired to the MASDC in 1971 and struck off the following year. Scrapping came in 1975. Total airframe hours were recorded as 12,151.

W2V-1

As a follow-on to its WV-2, Lockheed proposed an advanced AEW aircraft that combined the basic airframe of the Model 1649 Starliner civil transport and its high aspect ratio wings with the AN/APS-82 radar tested on the WV-2E. This search set was to be mounted atop the fuselage on a modified AN/APS-45 height finder radome. Work on the version for the Navy was started under the CL-257 designation, while that for the Air Force began under the CL-344 designation. With a maximum gross weight of 175,000 lb (79380 kg), these two versions were to be powered by four 4,050-eshp (3021-ekW) Allison T56-A-7 turboprops and two wingtip-mounted Westinghouse 3,250-lb st (14.45-kN) J34-WE-34 auxiliary turbojets. Both versions were proposed with Super Constellation triple tail surfaces or with enlarged twin vertical surfaces and no centre fin and rudder.

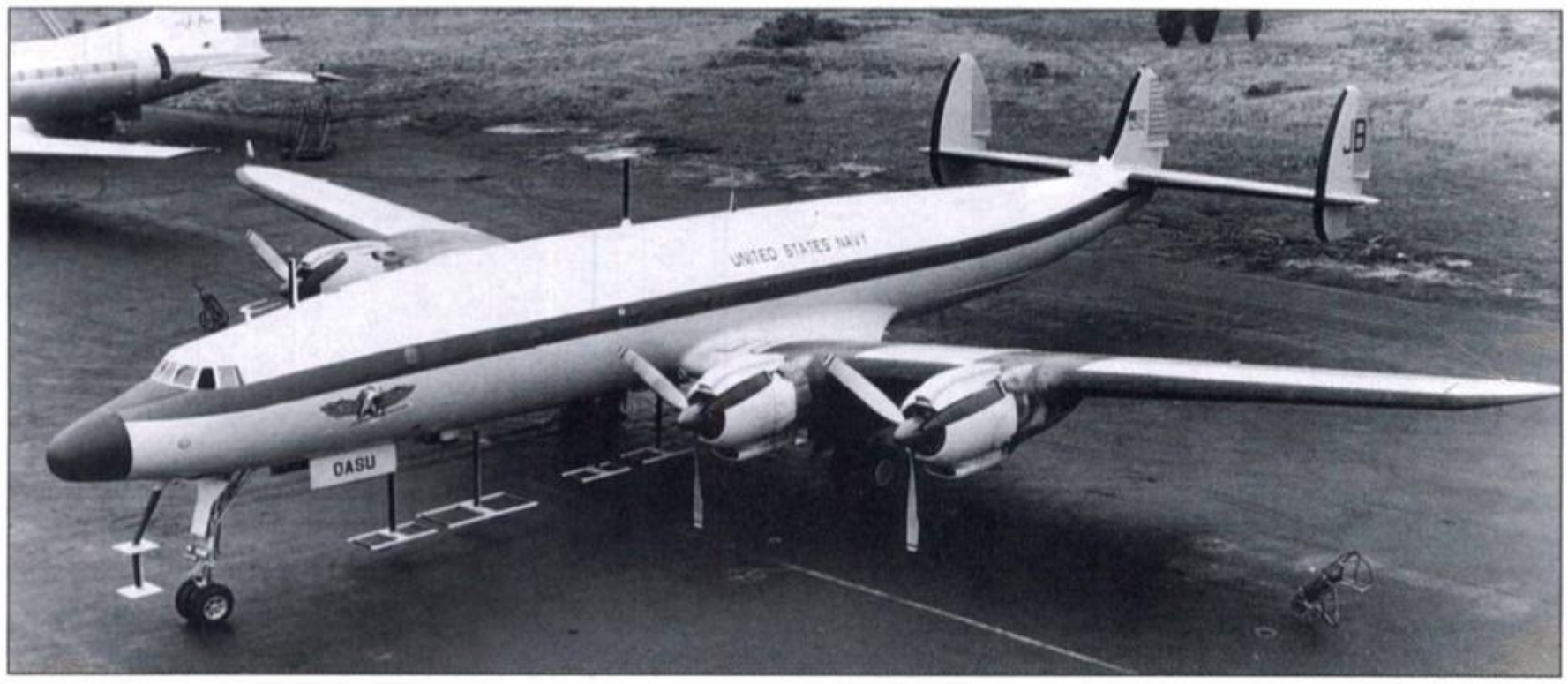
The Navy ordered two W2V-1 prototypes (Lockheed Model 084) in the spring of 1957, but this programme was cancelled after early U-2 overflights of the Soviet Union laid to rest fears of a bomber gap and, additionally, it had been determined that long-range surveillance could be provided more economically by low frequency radar stations on land. Accordingly, neither of the prototypes was completed and no additional development of the 'Willy Victor' took place. Initial USAF interest in the proposed CL-344 never resulted in a contract.



W2V-1

Dimensions for the W2V-1 included a span of 151 ft (46.02 m) including wingtip auxiliary turbojets, a length of 116 ft 8 in (35.56 m), a height of 30 ft 3 in (9.22 m), and wing area of 1,850 sq ft (171.87 m²).

NC-121J



The need to distribute information to the South Vietnamese populace was identified soon after American advisors began supporting Saigon forces in their fight against Communist insurgents. However, little was done until after American forces had been fully committed to ground operations in the Republic of Vietnam. To ensure that people living in the Mekong Delta also received the American version of events, the Chief of Naval Operation (CNO) tasked the Oceanographic Air Survey Unit (OASU) with providing airborne television and radio coverage.

To meet this Project Jenny requirement, three C-121Js were modified to the NC-121J Blue Eagle configuration with two video tape recorders, two 16-mm film projectors, six audio tape recorders, and a small sound-proof studio. Later, a fourth NC-121J (BuNo. 131627) was configured for radio broadcast missions only.

In support of Project Jenny operations, a Blue Eagle NC-121J flew every night from Can Tho and Tan Son Nhut at 12,000-15,000 ft (3658-4572 m) broadcasting specially prepared programmes from its sound-proofed mini-studio or rebroadcasting pre-recorded videotapes and 16-mm movie films to 500 TV sets distributed throughout the Mekong Delta by the US Agency for International Aid (USAID). The effectiveness of this Psy Ops programme caught the attention of the Communist leadership, and on 12 April 1966 the Viet Cong launched a mortar attack against the OASU aircraft at Tan Son Nhut AB. The three NC-121Js on base at the time of the attack were damaged, including one which was initially reported as 'completely demolished'. OASU personnel succeeded in repairing all three aircraft, with the more heavily damaged Blue Eagle II being returned to service 25 days after the attack. NC-121Js remained operational until their last operational mission on 30 September 1970.

NC-121J BuNos:
128444, 131627, 131641 and 131655
(4 converted from C-121Js)

With large antennas above and below the fuselage, the 'JB'-coded OASU Operation Jenny aircraft were easily recognisable (to friend and foe alike). The aircraft had a grey fuselage with a white top and blue cheatline. Note the 'blue eagle grasping a red lightning bolt' emblem.

JC-121K

An EC-121K (BuNo. 143196) was modified to meet the need of the US Army for a range surveillance aircraft equipped to photograph ballistic missile launches and nosecone re-entry. The search and height finding radars and the CIC equipment of the EC-121K were removed; cameras, infra-red sensors and tracking equipment were installed and a large fairing ('Dog House') was provided above the centre and rear fuselage. Numerous cut-outs in the upper sides of the fuselage had metal covers to protect their optical quality windows.

Retaining its Bureau Number instead of being assigned an Army serial number, this aircraft was operated primarily over the Kwajalein Missile Range from Bucholz Army Airfield in the Marshall Islands, until stored at MASDC in December 1967.

JC-121K BuNos: 143196 (1 from EC-121K)

BuNo. 143196 was named* Younger's Mistress, *for its commander, G. Younger. The aircraft was flown unpressurised and the rear cargo door removed for photography and the use of infra-red instruments as the latter was seriously effected by glass or plastic 'glazing'.

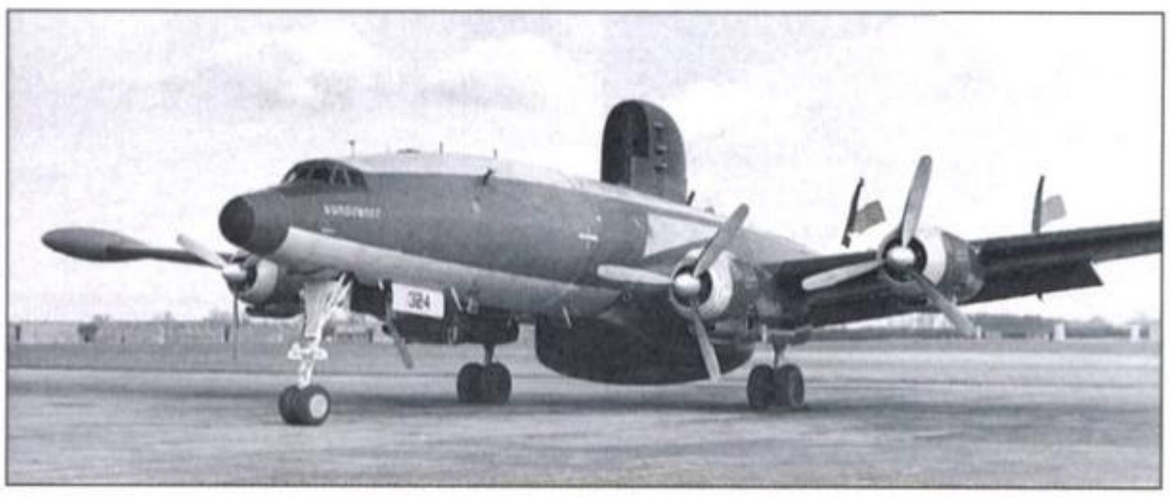
YEC-121K/NEC-121K

One EC-121K was successively modified to YEC-121K and NEC-121K configuration as an electronic testbed. It ended up as one of the NC-121Ks serving with OASU/VX-8.

YEC-121K/NEC-121K BuNo:
128324 (1 converted from EC-121K)

BuNo. 128324 was redesignated as an NEC-121K following removal of its dorsal radome and tip tanks. This had been carried out by May 1965 and was followed by a futher redesignation (to NC-121K).

At least three Constellations were provided by the Naval Air Test Center for use by the Naval Research Laboratory, based at Patuxent River.* Sundowner *was the sole YEC-121K (BuNo. 128324) used by the NRL's Weapons System Test Department. It was painted in a basic 'midnight blue' scheme with liberal application of Dayglo trimming and it later gained a stylised 'W' on the upper fuselage radome, before becoming the sole NEC-121K. The YEC-121K differed from standard EC-121Ks in being fitted with AiResearch auxiliary power unit (APU). After its service as a NEC-121K '324 finished up as one of the NC-121Ks used in Project Seascan.



NC-121K

Seven aircraft have been positively identified as having been given NC-121K designations. Reports of other aircraft designated NC-121Ks are either erroneous or unconfirmed. All confirmed NC-121Ks were EC-121Ks permanently modified to various configurations for use in research projects or as an electronic aggressor.

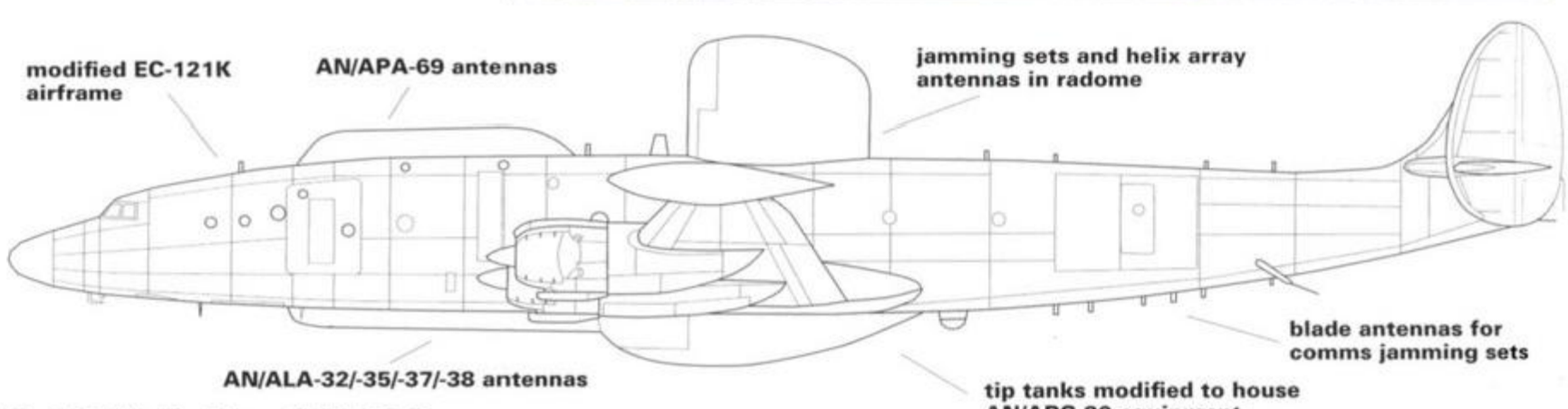
Established at NAS Patuxent River, Maryland, on 1 July 1965, the Oceanic Air Survey Unit (OASU) was redesignated Air Development Squadron Eight (VX-8) two years later. Under these two designations, this innocent-sounding organisation played a central role in compiling vitally important data for improving the Navy's anti-submarine warfare capability. For some of its many tasks, it used EC-121Ks modified to three different NC-121K configurations. BuNo. 141325 was configured for Arctic ice survey as part of Project Birdseye. BuNo. 145924 was fitted out with an airborne radiation thermometer to measure sea surface temperature, two experimental high-resolution radar systems to profile ocean waves, and expendable bathy-thermographs to measure ocean temperatures to a depth of 1,000 ft (305 m) as part of Project Seascan (aka, ASWEPS – Anti-Submarine Warfare Environmental Predication System). BuNos 128324, 131388 and 145925 were equipped for Project Magnet, a worldwide collection of magnetic data.

Tactical Electronic Warfare Squadron Thirty-Three (VAQ-33) became the flying unit of the Fleet Electronic Warfare Support Group (FEWSG) in 1969. In that capacity, it was equipped with a variety of aircraft configured as aerial jamming platforms. After operating an EC-121K alongside various jets, VAQ-33 obtained a specially modified NC-121K (BuNo. 141292) in 1972. Antennas for the AN/ALQ-124 countermeasure set were fitted in the nose radome, a tail radome, and in modified wingtip tanks (which no longer contained fuel) with flattened sides. These modified tanks also housed AN/ARC-30 equipment. A dorsal canoe ahead of the standard EC-121K radome contained three AN/APA-69 antennas, while the dorsal radome housed airborne jamming sets and helix array antennas. A ventral canoe ahead of the AN/APS-20 radome housed antennas for AN/ALA-32/-35/-37/-38 sets. In addition, BuNo. 141292 was fitted with numerous dorsal and ventral blade antennas for various communication jamming sets, as well as with two Longwire antennas between the forward upper fuselage and the outer fins. BuNo. 141292 became the last 'Connie' military descendant of the C-69 first flown more than 39 years earlier.

Another NC-121K , BuNo. 141297 with unspecified modifications, is known to have been operated by the Naval Air Development Unit (NADU) and the Naval Research Laboratory before being stored at MASDC in August 1979.

Paisano Dos ***(BuNo. 145925) continued the Project Magnet tradition begun with WV-2 BuNo. 126513*** **El Paisano,** ***with a Roadrunner cartoon character on its fuselage – although a much simpler version than that of '513. Its RP-3D Orion replacement,*** **Paisanos Tres,** ***was also adorned with a Roadrunner.***

The last US military Constellation was NC-121K BuNo. 141292 of VAQ-33. VAQ-33 was the flying unit of the Fleet Electronic Warfare Support Group and operated EA-4Fs, EA-6As, EF-4Js, ERA-3Bs and '292 to provide a suitably hostile EW environment for realistic training. On joining the unit '292 was coded 'GD/11' (inset), though this had changed to 'GD/12' by May 1976. It was finally retired in June 1982.


modified EC-121K airframe
AN/APA-69 antennas
jamming sets and helix array antennas in radome
blade antennas for comms jamming sets
AN/ALA-32/-35/-37/-38 antennas
tip tanks modified to house AN/ARC-30 equipment

NC-121K BuNo. 141292

NC-121K BuNos:
128324, 131388, 141292, 141297, 141325, 145924 and 145925 (7) (All were modified from EC-121Ks excepted the first, which had earlier been modified as the YEC-121K and then as the NEC-121K.)

Seen in December 1965, NC-121K BuNo. 145925 displays the titles of the Oceanic Air Survey Unit (OASU) and its 'JB' codes (right). '925 was one of three NC-121Ks used in Project Magnet, a geomagnetic survey programme begun in 1951 by the Hydrographic Office. Originally fitted in the demagnetised rear fuselage, a vector airborne magnetometer was carried under the fuselage in tip-tank-like fairings (below).

BuNo. 131388 was delivered to the USN as a WV-2 and initially served with VW-1. After further spells with VW-15 and VW-11 the aircraft had been transferred to the Naval Air Development Unit (NADU) by May 1961. After a period out of use the Naval Air Development Center (NADC) at NAS Johnsville, Pennsylvania converted the aircraft to NC-121K standard; its upper radome had been deleted by 1969. It is believed that '388 served with the NADC's ASW section, after which the aircraft was retired and struck-off in 1975.

BuNo. 141297 spent its entire service life engaged in test and development work. It served the US Naval Research Laboratory (as above) and Naval Air Test Center from September 1961 until August 1979.

VX-8's **The Arctic Fox** *(BuNo. 141325) was the Project Birdseye (polar ice and environmental data collection) aircraft, used between March 1962 and October 1973. It was replaced by a similarly-named RP-3A.*

El Coyote *was BuNo. 145924 used for Project ASWEPS (Anti-Submarine Warfare Environment Prediction Services). Note the old Project Magnet titles on the aircraft's tail.*

Seen on Malta in October 1970 in a new scheme, BuNo. 131388 still served the NADC. Note that by this stage its ventral radome had been removed and large observation windows fitted in the rear fuselage.

EC-121P

In the late 1940s, the AN/APS-20 had been successfully modified for use in the anti-submarine role, proving particularly successful when fitted to the TBM-3W2 'hunter' half of the TBM-3W2/TBM-3S2 hunter-killer team of Grumman Avengers. That capability proved useful when EC-121Ks were operating from Keflavik over the Iceland-UK gap. Rather than use its military Super 'Connies' solely in the AEW role, the Navy elected to have Keflavik-based aircraft modified to be used also in a limited ASW role. Accordingly, their AN/APS-20s were adjusted to improve their detecting capability against small surface targets (such as snorkels) and ASW stations were added to 22 EC-121Ps modified from existing EC-121K and NC-121K airframes.

Subsequently, three of these aircraft were modified as **JEC-121P** testbeds; although operated by the Air Force, they retained their Navy BuNos (143189, 143199 and 143200) until retired to MASDC.

EC-121P BuNos:
135750, 135753, 141296, 141306, 141317, 141320, 141328, 141330, 143188/143189, 143199/143200, 143205/143206, 143215, 145927 and 145937/145941 (22 modified from EC-121K airframes) and 141292 (1 modified from NC-121K)

Above right: BuNo. 143188 of the AEWBARONPAC later served in Iceland as an EC-121P.

Right: EC-121P BuNo. 141317 carries the 'MK' codes and 'circled 13' marking of VW-13.

USAF Super Constellation variants

C-121C

Ordered under Navy contract NOa(s) 54-427, the 33 C-121C cargo/passenger transports were based on the Model 1049D airframe developed for civilian customers. Like these civil Super Constellations, the C-121Cs (Lockheed Model 1049F-55-96) had square windows, reinforced flooring, and upward-opening cargo loading doors fore and aft of the wings. However, they differed from the four Model 1049Ds built for Seaboard & Western Airlines in having strengthened wing for operations at a maximum gross weight of 137,500 lb (62370 kg) – some 90 per cent more than the gross weight of the original C-69 Constellation. Moreover, provision was made for eventual strengthening of the fuselage if the Air Force elected to proceed with a proposed re-engining of its C-121Cs with turboprops; in that event, gross weight was to be boosted further to 150,000 lb (68040 kg). The Air Force did not exercise its option of having turboprop engines retrofitted, and all C-121Cs were powered by four 3,250-hp (2424-kW) Wright R-3350-91 turbo-compound radials.

The standard C-121C cockpit crew of five (pilot, co-pilot, navigator, flight engineer and radio operator) could be supplemented for long-range operations by a relief crew of three. Accommodation was provided for either 72 troops, 47 litter patients and two medical attendants, or 36,000 lb (16330 kg) of military cargo.

Two C-121Cs were converted as electronic testbeds: 54-0160 was successively redesignated **JC-121C**, **EC-121C** and then **NC-121C**, while 54-0178 became a JC-121C before becoming an EC-121C prior to being stored at MASDC. Two others (54-0168 and 54-0174) were operated by the National Guard Bureau at Andrews AFB as **VC-121C** staff transports, while six received EC-121S designations (as described below).

C-121C serials:
C-121C-LO: 54-0151/0183 (33)

C-121C 54-0153 of the 150th Military Airlift Squadron, New Jersey ANG, is seen at McClellan AFB on 28 October 1967. By this time most USAF C-121 transports were finished in this natural metal and white paint scheme.

C-121C

square cabin windows
accommodation for up to 72 troops
upward-opening cargo doors
Wright R-3350-91 turbo-compound engines
150,000-lb (68040-kg) maximum gross weight

Right: The first C-121C, seen here in MATS Atlantic Division colours, was delivered to the 1608th ATW.

Above: The square cabin windows fitted to many USAF Super Constellation transports are visible on these 150th ATS (Heavy)/New Jersey ANG C-121Cs.

Above: The immaculate C-121C 54-0181 served the headquarters of the National Guard Bureau until June 1975. It is seen at its base, Andrews AFB, in May 1974.

JC-121Cs 54-0160 (left) and 54-0178 were used in Project MARCOM (Microwave Airborne Radio Communication) Relay, aimed at testing the provision of communications in a post (nuclear) strike environment. Receiving and transmitting antennas were mounted in radomes above and below the fuselage. The project was completed in mid-1968.

RC-121C

Given the Lockheed Model 1049B-55-84 designation, the 10 RC-121C Warning Stars became the first aircraft in the Super Constellation family to be ordered for the Air Force, in August 1950, when they were included in Navy contract NOa(s) 51-142 which also included 11 R7V-1 naval transports. Powered by 3,250-hp (2424-kW) Wright R-3350-91 turbo-compounds, these Air Force airborne early warning and control aircraft differed from Navy WV-2s in (1) lacking provision for tip tanks, (2) being fitted with Air Force radios and instrumentation, and (3) having the CIC plotter station replaced by a moving target display. Crew, including relief personnel, totalled 31.

Rapidly supplanted in AEW service by more capable RC-121Ds, nine of the 10 RC-121Cs (the exception being 51-3838 which had crashed in San Francisco Bay on 21 November 1953) were redesignated **TC-121C**s when they were assigned as trainers for the later Warning Star variant. One of the TC-121Cs (51-3841) later became a JC-121C test aircraft.

RC-121C serials:
RC-121C-LO: 51-3836/3845 (10)

Above: The first Super Constellation ordered by the USAF, 51-3836 was to be the last RC-121C delivered, going to Air Defence Command's 8th Air Division in December 1953.

Below: The last RC-121C (51-3845) had had its radomes removed by 1961, becoming a TC-121C. Note that its serial is misrepresented here as '0-03845'.

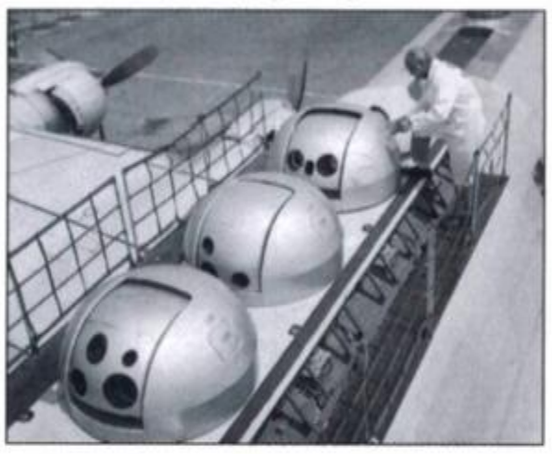
NC-121D

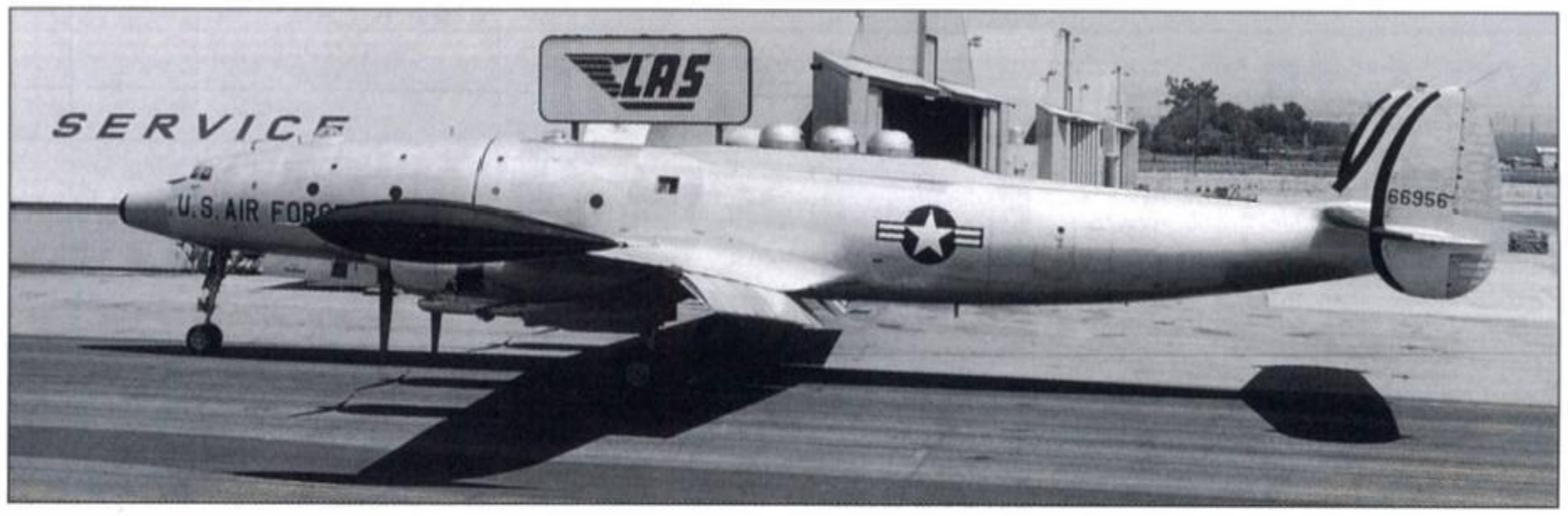
After serving with the Navy as a WV-2 and EC-121K, BuNo. 143226 was transferred to the Air Force to be modified as a research aircraft to measure radiation from re-entering space vehicles as part of the Trap III programme in Project PRESS (Pacific Range Electronic Signature Studies). The dorsal radome was replaced by a row of three turrets housing high-speed cameras and other recording devices, leading to the aircraft being nicknamed 'Triple Nipple'. In service with the Air Force Systems Command it received the serial 56-6956. It arrived for storage at MASDC in September 1969.

NC-121D serials: 56-6956 (1 modified from ex-USN WV-2 BuNo. 143226)

Initially designated a GRC-121D when bailed out to Bendix, 56-6956 later became the NC-121D.

Below: The TRAP III turrets are given scale by a technician perched on the temporary gantry.





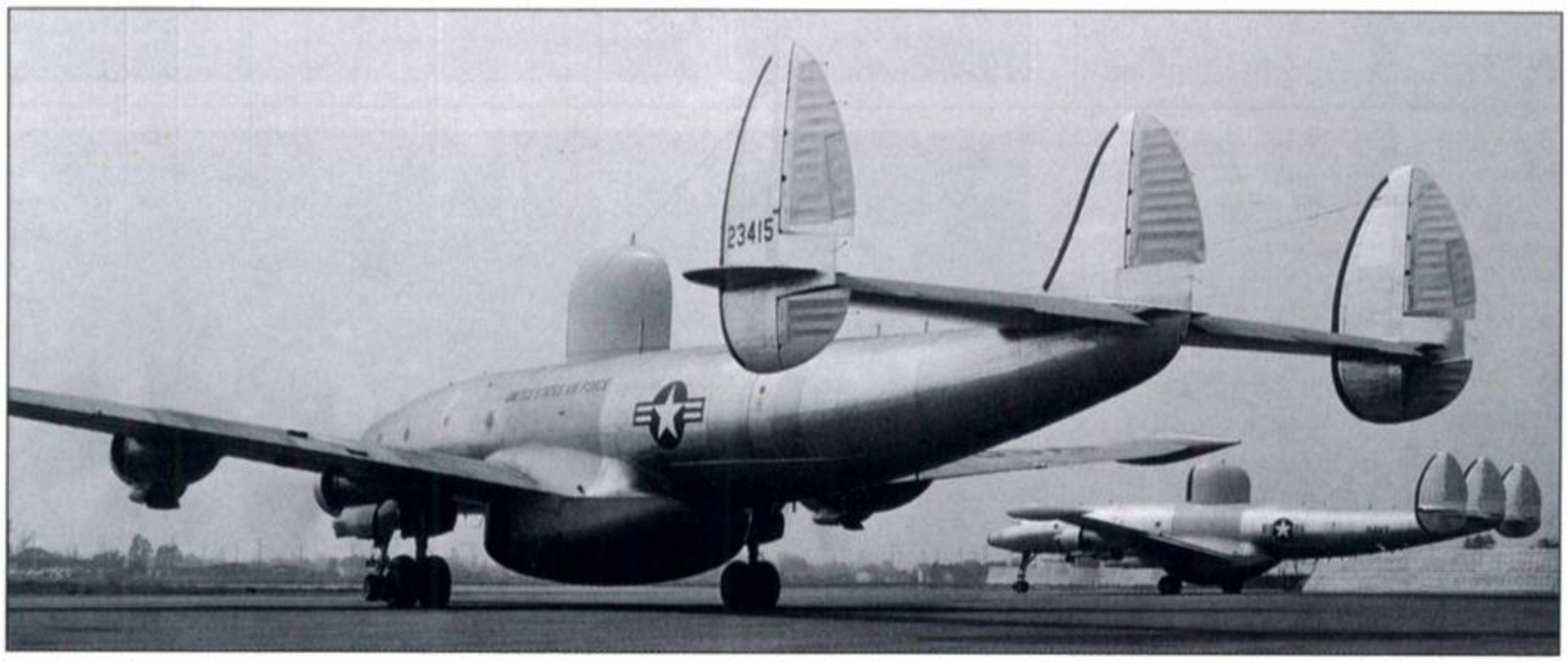
RC-121D (EC-121D)

Five batches of airborne early warning and control aircraft were ordered for the Air Force under Navy contracts beginning in January 1952 (15 aircraft under NOa(s) 52-763; 24, six and five under NOa(s) 53-332; and 22 under NOa(s) 55-172). Given the Lockheed Model 1049A-55-86 designation, they differed from Navy WV-2s mostly in being fitted with Air Force communications equipment and instrumentation, as well as in minor changes in crew accommodation (notably the installation of fixed overhead bunks over double sleeperette chairs on the right-hand and left-hand sides of the forward relief crew area in lieu of table, benches and seat-bunk). Like the WV-2s, they were fitted with 600-US gal (2271-litre) tip tanks and had two fuselage tanks beneath the flooring to bring total fuel capacity to 8,750 US gal (33122 litres).

Powered by four 3,250-hp (2424-kW) Wright R-3350-91 turbo-compound radials, they were initially fitted with an AN/APS-20E search radar in a ventral radome, an AN/APS-45 height finder radar in a dorsal radome, and an AN/APS-42 weather/navigation radar in the nose. In about 1962, the AN/APS-20E was replaced in the ventral radome by the AN/APS-95. At that time, the active crew was revised to include 16 officers and NCOs (pilot, co-pilot, navigator, flight engineer, radio operator, senior weapons controller, plotter, three search radar operators, height finder operator, surveillance supervisor, duty weapons controller, scanner recorder and two radar technicians). Accommodation was also provided for 16 relief crew members.

All but three of the 72 RC-121D Warning Stars survived to be redesignated EC-121Ds in September 1962 in accordance with Joint Regulation AFR 66-11. Of these, 26 became EC-121Hs, at least six were upgraded as EC-121Qs, and 22 ended as EC-121Ts (described separately).

As the original Project Cadillac III development had been sponsored by the Navy to obtain AEW & CIC aircraft intended to support fleet operations at sea, their radar had been optimised for detecting aircraft over water, not over land where ground clutter limited the effectiveness of early airborne radar. Likewise, the Air Force RC-121D Warning Star had been intended to extend US radar coverage over the North Atlantic and the Pacific, and thus retained virtually unchanged the radar installation of the Navy WV-2. Not surprisingly, that installation was far from being optimised to track North Vietnamese interceptors who hid in ground clutter until their GCI controllers vectored them to approaching US aircraft. Fortunately, when faced with the need to provide strike aircraft with adequate warning of impending North Vietnamese interceptions, the Air Force was able to fall back on experience gained while monitoring the activities of Soviet-supplied fighters in Cuba.

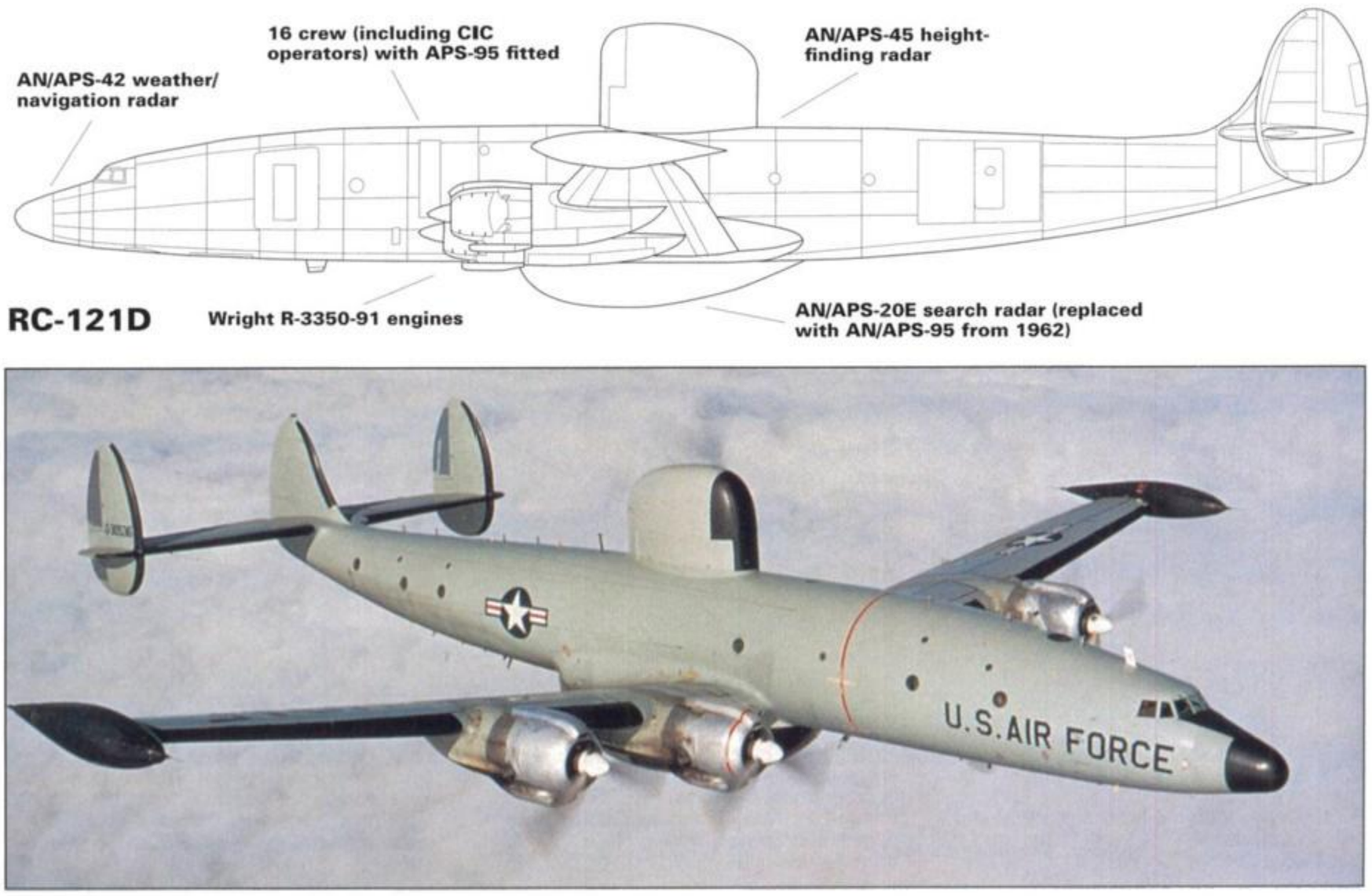


Little difference is discernible between RC-121D 52-3415 and the WV-2 in the background. Delivered in a natural metal, the RC-121Ds gained an overall grey scheme in service.

To that end, the Air Force had fitted QRC-248 sets to a few EC-121Ds so that the MiGs' SRO-2 IFF transponder (NATO 'Odd Rods') could be interrogated passively. Experience gained during operations around Cuba had demonstrated that, using their QRC-248 set, controllers were able to track MiGs operating at low level when ground clutter drastically limited the effectiveness of the EC-121D's radar. As ground clutter was even more of a factor in North Vietnam, an EC-121D equipped with QRC-248 was sent for Quick Look evaluation from Tan Son Nhut AB between mid-December 1966 and mid-January 1967. Success with that evaluation led to all EC-121Ds deployed to Southeast Asia being fitted with QRC-248 by the end of May 1967.

RC-121D serials:
RC-121D-LO: 52-3411/3425 (15), 53-0533/0556 (24), 53-3398/3403 (6), 54-2304/2308 (5) and 55-0118/0139 (22)

EC-121D 53-0536 is seen in November 1969 when assigned as part of the College Eye task force, orbiting above the Gulf of Tonkin to control air traffic over Vietnam, assign strike aircraft to controllers and warn of approaching MiGs. It was assigned to the 552nd AEW&CW home-based at McClellan AFB. The aircraft carries the 'O for obsolete' prefix to its serial, signifying that it is over 10 years old. It continued in USAF service until March 1971, when it was sent for storage at Davis-Monthan AFB, Arizona.

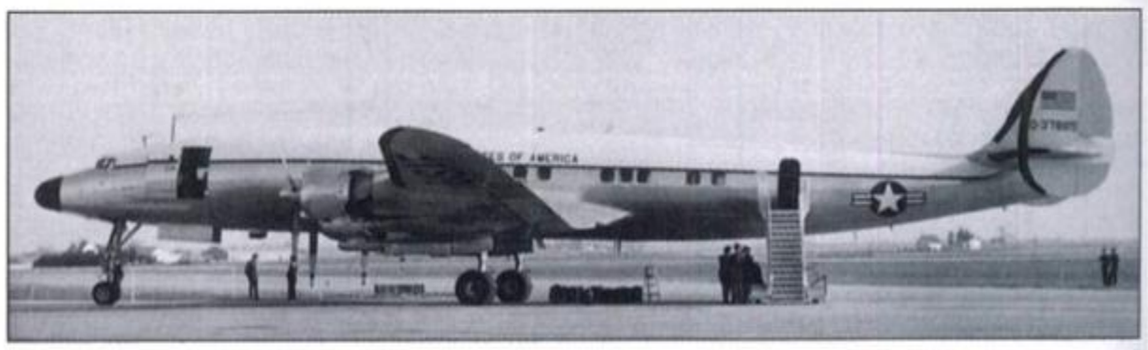

16 crew (including CIC operators) with APS-95 fitted
AN/APS-45 height-finding radar
AN/APS-42 weather/ navigation radar
RC-121D
Wright R-3350-91 engines
AN/APS-20E search radar (replaced with AN/APS-95 from 1962)
U.S. AIR FORCE

VC-121E

Dated 10 February 1951, Navy contract NOa(s) 51-655 covered 41 R70-1s (soon redesignated R7V-1s) for the Naval Air Transport Service. The first modification to that contract was to have two aircraft completed as turboprop-powered R7V-2s (with two added later); on 18 May 1953, NOa(s) 51-565 was again amended to have BuNo. 131650 converted as a Presidential aircraft under Project Green Valley. Title to that aircraft was transferred to the Air Force, the aircraft becoming the sole VC-121E and receiving the USAF serial 53-7855.

Although it started down the line as an R7V-1, the VC-121E was completed as a Lockheed Model 1049B-55-97 with square windows, such as those used on civil Super Constellations and Air Force C-121Cs, instead of portholes as used on Navy R7V-1s. Powered by four 3,250-hp (2424-kW) Wright R-3350-91 Turbo Cyclones, the VC-121E had accommodation for a crew of 18 (including relief crew, stewards and support personnel) and either 28 'day' passengers or 10 'sleepers' and 'six sit-ups' in the night configuration.

The VC-121E was christened *Columbine III* by First Lady Mamie Eisenhower on 24 November 1954. While in service with the 1254th Air Transport Group then based at the Washington National Airport, *Columbine III* became the first aircraft to be assigned the Air Force One callsign. It was replaced as Air Force One by a Douglas C-118A (53-3240) after President John F. Kennedy was inaugurated in January 1961. Finally, *Columbine III* went to the Air Force Museum at Wright-Patterson AFB, Ohio, in 1966.



Above and right:* Columbine III *differed from C-121Cs in having fewer passenger cabin windows.

VC-121E serials: VC-121E-LO: 53-7855 (1)

YC-121F

At one point, the Air Force seriously contemplated ordering turboprop-powered Super Constellation transports and set aside the C-134 designation for these aircraft. However, that plan never materialised and the two YC-121Fs were the only USAF turbine-engined 'Connies'. These two aircraft had been completed for the Navy under an amendment to contract NOa(s) 51-655 and initially were BuNos 131660 and 131661. Aircraft 53-8158 was delivered to the USAF with only 42 passenger seats, since some electronic test equipment remained in it. However, both YC-121Fs were eventually brought to full Lockheed 1249A-94-75 standard with alternative accommodation for either four crew members and 106 passengers for overland operations; 15 crew members and 87 passengers or 35,500 lb (16103 kg) of cargo for overwater operations; or four crew members, four attendants and 73 litter patients for overwater aeromedical evacuation.

After their Air Force test and evaluation had been completed, the two YC-121Fs were based at Kelly AFB, Texas, from where they were flown operationally by the Service Test Squadron (Turboprop) of the Military Air Transport Service.

YC-121F serials: YC-121F-LO: 53-8157/8158 (2 ex-Navy R7V-2s)

Displaying USAF titles and its USN BuNo, YC-121F 53-8157 is seen prior to delivery to Edwards AFB for USAF flight testing.

YC-121F specification

Span:	117 ft (35.66 m)
Length:	116 ft 2 in (35.41 m)
Height:	27 ft (8.23 m)
Wing area:	1,615 sq ft (150 m²)
Empty weight (overwater configuration):	72,387 lb (32835 kg)
TO gross weight (normal):	150,000 lb (68040 kg)
TO gross weight (overload):	169,800 lb (77021 kg)
Max. fuel capacity:	8,750 US gal (33122 litres)
Max. speed at 20,000 ft (6096 m):	429 mph (690 km/h)
Typical cruise speed at 20,000 ft (6096 m):	387 mph (623 km/h)
Max. rate of climb at sea level:	2,240 ft/min (11.4 m/sec)
Service ceiling:	29,500 ft (8992 m)
Range with full passenger payload:	2,760 miles (4442 km)

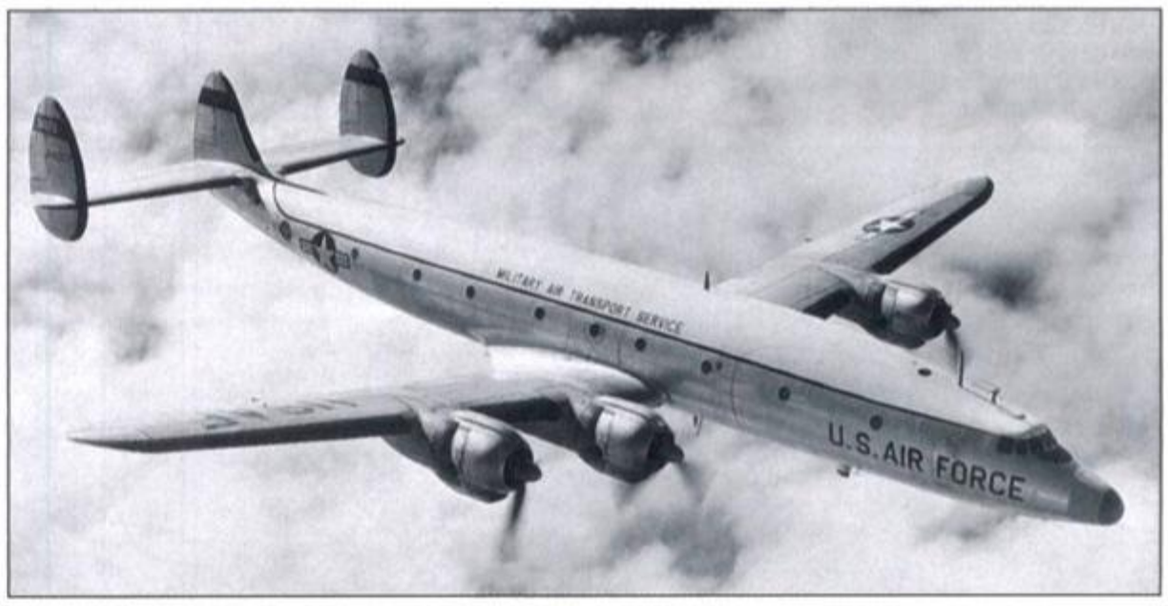
Both USAF YC-121Fs were finished in MATS markings for service evaluation with the 1700th Test Sqn (Turboprop), between March 1955 and 1957.

C-121G

In accordance with the March 1948 decision of the Department of Defense to merge progressively the Naval Air Transport Service into the Military Air Transport Service, 32 Navy R7V-1s were transferred to the Air Force as C-121Gs. These ex-Navy aircraft were easily distinguished from the original Air Force C-121Cs as they had cabin portholes (eight on the starboard side) instead of square cabin windows (20 on the starboard side)

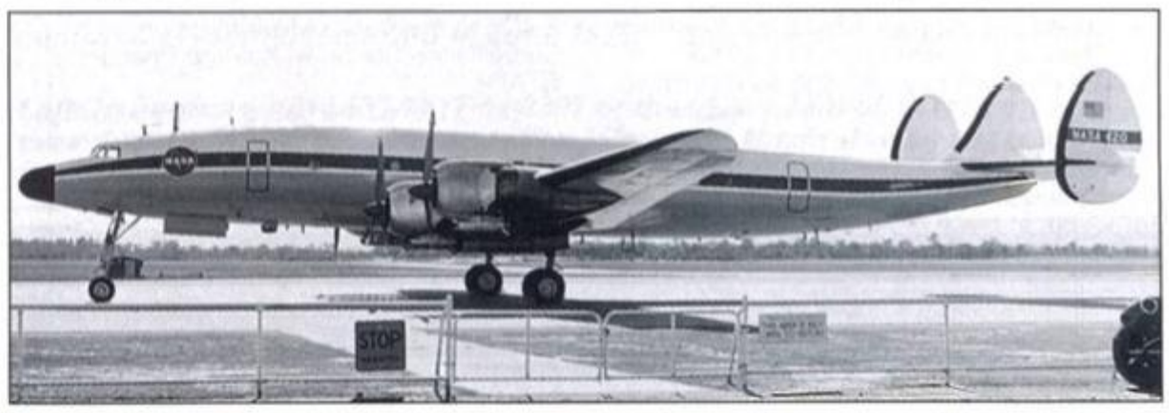
Three ended as **TC-121G** trainers (54-4050, 54-4052 and 54-4058) for Air Force EC-121 crews. Another (54-4051) received VIP accommodation for service as the MACV (Military Assistance Command Vietnam) staff transport and may have been temporarily designated as a **VC-121G** before becoming a TC-121G, again with more spartan accommodation. Two retained their C-121G designation after being transferred to NASA for use in scientific experiments and for logistic support at the Wallops Flight Facility, Wallops Island, Virginia, and the Goddard Space Flight Center, Greenbelt, Maryland; with NASA they were given civil registrations (N420NA and N421NA).

C-121G serials: C-121G-LO: 54-4048/4079 (32 ex-Navy R7V-1s)



Above: C-121G 54-4052's naval origins are betrayed by its round passenger cabin portholes.

Below: NASA 420 (formerly NASA 20, 54-4065 and BuNo. 131642) served the Administration for 10 years.



Below: C-121G 55-4062 is seen while assigned to the 4759th Air Defense Sqn (Training) (later the 4759th CCTS) of the 552nd AEW&CW, at McClellan AFB in the early 1970s. Its main roles were training and deployment support.

EC-121H

Stemming from the 1951 Project Lincoln, itself a follow-on to the 1950 Project Charles research programme managed by the Lincoln Laboratory at the Massachusetts Institute of Technology, the SAGE (Semi-Automatic Ground Environment) system was adopted by the USAF in April 1953. It provided for the development of a datalink for automated presentation of data on a radar scope rather than through voice radio communications. The first experimental SAGE centre was established on 1 June 1955 at the Lincoln Laboratory in Lexington, Massachusetts, as the 4620th Air Defense Wing (Experimental SAGE).

To work as an integral part of the SAGE system, 27 Air Force EC-121Ds and seven ex-Navy WV-2s (BuNos 141289, 141291, 141300, 141302, 141333, 141318 and 141327, which were given Air Force serials 55-5262 to 55-5268, respectively) were fitted with an onboard data processor to feed radar data to SAGE centres by means of a radio transmitter (AGDL/air-to-ground datalink and TDDL/time division datalink) with a steerable antenna in a smaller dorsal radome located between the cockpit and the main dorsal radome. In addition, their search radar and height finder radar were upgraded to AN/APS-95 and AN/APS-103 standard. A second ventral air scoop was mounted aft of the ventral radome to cool the extra electronic equipment. Two technicians were added to the standard EC-121D crew. Two EC-121Ts were later upgraded as EC-121Q and EC-121T (as described below).

EC-121H serials:
EC-121H-LO: 52-3412, 52-3420, 54-3422, 53-0533, 53-0535/0541, 53-0544, 53-0549, 53-0551, 53-0553, 53-3403, 55-0118/0119, 55-0125/0126, 55-0129/0132, 55-0134 and 55-0136 (27 upgraded EC-121Ds) plus 55-5262/5268 (7 ex-Navy WV-2s)

55-0134 (above right) and 53-0533 (right) of the Otis AFB-based 551st AEW&CW – the Air Defense Command's (ADC) east coast airborne radar wing – both display the dorsal ALRI radome peculiar to this variant. Prominent 551st AEW&CS badges and unit citations and ADC shields complete the aircrafts' markings.

EC-121Q

Five EC-121Ds and one EC-121H (from which the SAGE equipment and its associated small dorsal dome were deleted) were modified to this standard with AN/APS-95 search radar in the ventral radome and AN/APS-103 height finder radar in the dorsal radome. The radar upgrade of these aircraft was part of the Brass Knob programme which may well have included other, then classified and still elusive, modifications. All EC-121Qs ended at MASDC before the 552nd AEW&CW was inactivated at McClellan AFB on 30 April 1976 (only to be reactivated at Tinker AFB on 1 July 1976 to commence preparing for AWACS operations).

EC-121Q serials:
EC-121Q-LO: 53-0541 (1 upgraded from EC-121H), 53-0542, 53-0547, 53-0556, 55-0120, and 55-0128 (5 upgraded from EC-121D)

The EC-121Qs served with the 552nd Airborne Early Warning & Control Sqn based at McClellan AFB, California. The EC-121Qs were operated mainly over the Arctic and deployed to Iceland, hence the liberal application of Dayglo to the nose, fins and wingtips, to aid conspicuity in the event of a crash landing 'on the ice'. USAF 53-0556 is seen with other C-121s undergoing maintenance at the Sacramento Air Logistics Center in 1973 (left) and on approach in May 1973.

EC-121R

Described in a January 1970 DoD document as "Navy special electronic EC-121K/P aircraft modified to an AF special electronic capability", the 30 EC-121Rs were data relay aircraft for use in the Ho Chi Minh Trail interdiction programme. Their radar and associated ventral and dorsal radomes were removed. In place of AEW equipment, these aircraft were fitted with electronic equipment to relay data collected by Helosid and Spikebuoy ALARSs (Air Launched Acoustical Reconnaissance Sensors) seeded along the infamous trail by CH-3C helicopters, Navy OP-2Es and Air Force F-4Ds to the Dutch Mill Infiltration Surveillance Center at Nakhon Phanom RTAFB.

EC-121Rs of the 553rd Reconnaissance Wing arrived at Korat RTAFB on 18 October 1967 as the main component in the Air Force component of the Muscle Shoals programme. They became fully operational at the onset of the battle for Khe Sanh, when they provided valuable real-time intelligence to help defeat a powerful North Vietnamese offensive.

As part of Project Batcats, the EC-121Rs were subsequently modified and flew Igloo White orbits outside of high-threat areas to relay data collected by Beech YQU-22A electronic intelligence-gathering drones (between March and July 1969). Following the first operational sorties with improved QU-22B drones in October 1970, the number of EC-121Rs was progressively reduced. The 553rd RW was inactivated in December 1970 but EC-121R Batcats continued to be operated by the 553rd Reconnaissance Squadron, by then assigned to the 388th TFW. Finally, the last EC-121Rs were withdrawn in the autumn of 1971 and flown back to the United States for storage at MASDC.

EC-121R serials:
EC-121R-LO: 67-21471/21500 (25 modified from EC-121Ks, 2 from WC-121Ns and 3 from EC-121Ps)

EC-121R 67-21477 (ex-EC-121P BuNo. 141320) is seen at McClellan AFB with the 553rd RW. The 'Rs were the only camouflaged C-121s.

EC-121S

The six Air Force EC-121S Coronet Solo airborne television and radio broadcast platforms were the direct equivalent of the Navy Blue Eagle NC-121Js. Unlike the Navy variant which used C-121J airframes, the Air Force EC-121Ss used C-121C airframes modified by Lockheed Air Service in Ontario, California. All were operated by the 193rd Tactical Electronic Warfare Group, Pennsylvania ANG, beginning in the summer of 1968.

Between 26 July 1970 and 24 December 1970, Pennsylvania ANG volunteers went to Korat RTAFB to support the Commando Buzz deployment of a pair of EC-121Ss. Initiated less than three months after the United States intervened in Cambodia, Commando Buzz provided nightly telecast/broadcast programmes until a ground broadcast station could be set up in Cambodia. After their Southeast Asia stint, EC-121Ss remained in PA ANG service until the last was sent into storage at MASDC on 14 May 1979.

EC-121S serials:
EC-121S-LO: 54-0155, 54-0159, 54-0164, 54-0173, 54-0180 and 54-0183 (6 converted from C-121Cs)

These anonymous-looking 193rd TEWS EC-121S were the last ANG Constellations in service, replaced by EC-130E Rivet Riders in 1979.

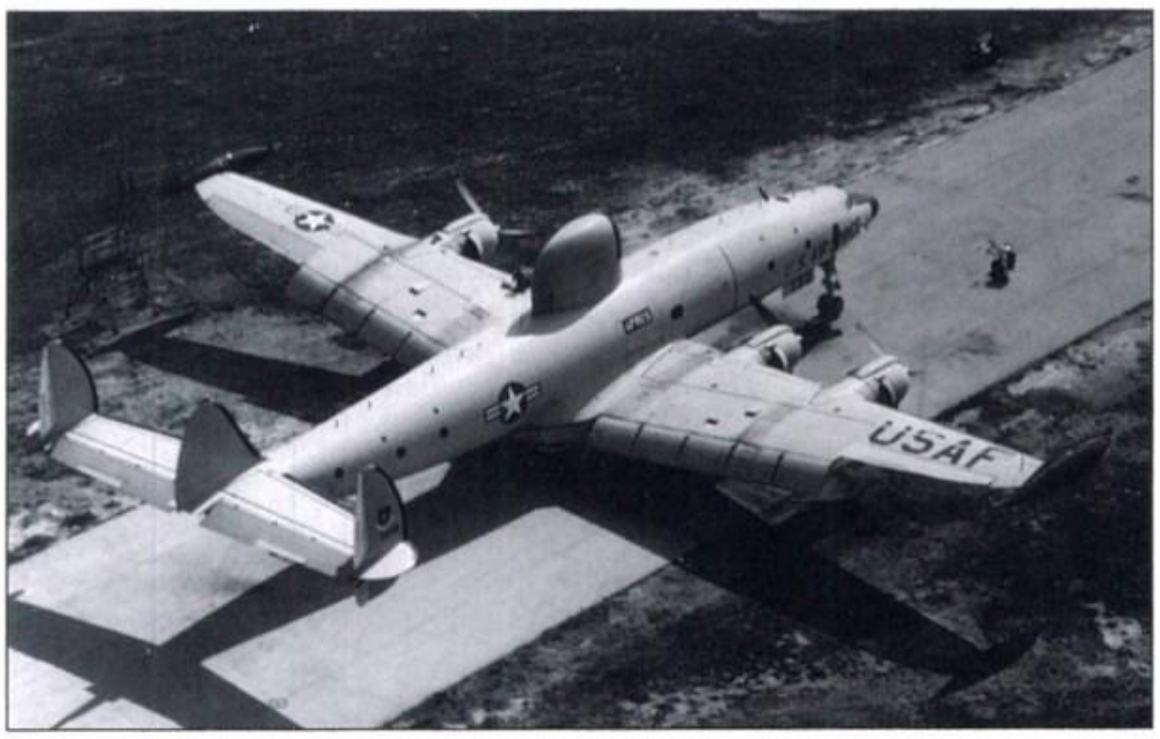
EC-121T

The ultimate US military development in the Constellation family, the EC-121Ts resulted from yet one more upgrade to 22 EC-121Ds and one EC-121H (from which the SAGE equipment and its associated small dorsal dome were deleted). Modifications increased empty weight from 80,611 lb (36565 kg) for the EC-121D to 82,630 lb (37481 kg), while normal and overload take-off weight were increased, respectively, from 130,000 to 149,600 lb (58968 to 67859 kg) and 143,600 to 152,500 lb (65137 to 69174 kg). To cope with this weight growth, maximum take-off power was increased to 3,400 hp (2536 kW) by upgrading their Wright turbo-compound engines to R-3350-93 standard.

All EC-121Ts had their search radar upgraded to AN/APS-95 standard but only eight retained the AN/APS-45 height finder radar and its associated dorsal radome. In addition, much of the communications equipment was upgraded for increased reliability. The most significant change to the aircraft's electronics was the addition of an AN/AYQ-5 computer.

The last Air Force AEW Warning Star was retired on 4 October 1978 when 55-0122 of the 79th AEW&CS, 915th AEW&CG, AFRes, flew from NS Keflavik, Iceland, on its way to storage at MASDC. It arrived at Davis-Monthan AFB eight days later.

EC-121T serials:
EC-121T: 52-3411, 52-3414, 52-3417/3419, 52-3423/3425, 53-0548, 53-0550, 53-0554, 53-3398, 53-3401, 54-2306/2307, 55-0121/0122, 55-0124, 55-0133 and 55-0137/0139 (22 upgraded from EC-121Ds), plus 52-3412 (1 upgraded from EC-121H)



EC-121T specification

Span:	123 ft 6 in (37.64 m)
Length:	116 ft 2 in (35.41 m)
Height:	27 ft (8.23 m)
Wing area:	1,653.6 sq ft (153.62 m²)
Empty weight:	82,630 lb (37480 kg)
Combat weight:	129,560 lb (58768 kg)
TO gross weight (normal):	149,660 lb (67886 kg)
TO gross weight (overload):	152,500 lb (69174 kg)
Max. fuel capacity:	8,750 US gal (33122 litres)
Max. speed at 16,000 ft (4877 m):	325 mph (523 km/h)
Typical cruise speed at 10,000 ft (3048 m):	230 mph (370 km/h)
Climb to 10,000 ft (3048 m):	26 minutes
Service ceiling:	17,000 ft (5182 m)
Combat range at 10,000 ft (3048 m):	3,125 miles (5029 km)
Time on station at 10,000 ft (3048 m) and 1,150 miles (1851 km) from base:	3 hours 48 minutes

Above left: This bird's eye view of 55-0138 of the 79th AEW&CS, AFRes, was captured at Homestead AFB in June 1975.

Above: On the majority of the EC-121Ts (including 53-0548) the dorsal radome was deleted.

Left: In February 1976 EC-121T 54-2307 of the 552nd AEW&CW was on detachment to Keflavik, Iceland. The 552nd was the first wing to receive E-3A AWACS in March 1977, signalling the end for the USAF's EC-121s.

Foreign military variants

L-1049G (India)

The Indian air force acquired nine L-1049Gs from Air India in 1961/62 for service as transports and maritime patrol aircraft (the latter with No. 6 Sqn, replacing Liberators). Employed, for the most part, within India, the aircraft's only regular trips abroad were New Delhi – London-Northolt courier flights between 1962 and 1973 (usually undertaken using one of two aircraft fitted with a cargo door).

Maritime operations were carried out up to 200 miles (322 km/h) miles off the Indian coast and, during hostilities with Pakistan, were escorted by Canberra bombers. The MR tasking was handed to No. 312 Sqn, Indian navy in November 1976, five aircraft being transferred to the navy after conversion at Bombay. Withdrawal was planned for 1981, with the delivery of Ilyushin Il-38 'May' aircraft, but this was delayed until the mid-1980s.

The two cargo door-equipped IAF aircraft continued in service until 1981.

L-1049G serials:
Indian Air Force: BG575/BG583 (9 ex-Air India L-1049Gs: VT-DHM, VT-DIM, VT-DHN, VT-DIL, VT-DJX, VT-DHL, VT-DGL, VT-DGM and VT-DJW, respectively)
Indian Navy: IN315/IN319 (5 ex-Indian Air Force L-1049Gs: BG575, BG576, BG580, BG581 and BG582)

Left: BU579/'D' was originally Air India's VT-DJX, entering service as **Rani of Saguri** *in 1958. One of the two aircraft equipped with a cargo door in 1960 (along with VT-DJW, later BG583), it was bought by the air force on 16 January 1962 and remained in IAF service until at least mid-1981.*

Above: In this view of IN315 (ex-BG575) various additional antennas are evident above the forward fuselage and below the rear of the aircraft, including a prominent 'dustbin' radome. The 'DAB' legend on the tailfin refers to the aircraft's base – Dablomin Air Base, near Goa.

Below left: VT-DGL **Empress Nurjehan** *was Air India's first L-1049, delivered in April 1954. Sold to the IAF in April 1962 it became BG581.*

L-1049C/H (Indonesia)

In 1969 Pakistan International Airline's last three Super Constellations (one L-1049C and two L-1049Hs) were donated by the Pakistani government to Indonesia in return for assistance given to Pakistan (in the form of MiG-19s) during hostilities with India.

Entering service with the AURI the aircraft served as transports into the early 1970s. The two L-1049Hs appear to have been withdrawn from use and stored in 1973, the L-1049C following suit in 1978.

L-1049C/H serials:
T1041/T1042 (two ex-PIA L-1049Hs: AP-AJY and AP-AJZ, respectively)
T1043 (one ex-PIA aircraft L-1049C: AP-AFR)

RAAF 1950-1959

In August 1945, at the end of World War II, the Royal Australian Air Force (RAAF) could boast an operational total of 75 flying squadrons and 25 flights and/or special units, but (as with most other air arms worldwide) a process of rapid contraction had already begun. By December 1945, for example, a scant four months later, the RAAF found itself reduced to just 37 operational squadrons (and nine flights), with a total establishment of 680 aircraft.

In keeping with other Commonwealth Air Forces, these figures contracted even further during the following two years as Australia sought to regain a peacetime standard of living. However, an analysis of the world situation, and study of Australia's requirements by the government in 1947, led to an announcement that, as part of a five-year plan, RAAF strength would be increased to approximately 14,000 personnel and 16 operational squadrons. RAAF personnel establishment had fallen to 35,000 by June 1946 (down from a wartime peak of more than 170,000), before reaching a post-war low of 8,025 in 1948. In the event, by 1 January 1950 RAAF strength was established at 18 operational squadrons (and one flight), four of these being Citizen's Air Force units manned largely by part-time personnel.

Overseas commitments

Despite the rapid loss of personnel and aircraft, the RAAF soon found itself embroiled in conflict in other parts of the world, beginning with the detachment of three fighter squadrons to the British Commonwealth Occupation Force in Japan. Later came the supply of 41 Dakota aircrews to RAF units taking part in the Berlin Airlift, the support of Britain throughout the Malayan Emergency, and the active part played by No. 77 Squadron during the course of the UN action in Korea. Later still, in 1952, the RAAF again provided assistance to Britain, when No. 78 (Fighter) Wing (Nos 75 and 76 Squadrons) was dispatched to Malta to undertake garrison duties.

Although RAAF participation in the Korean conflict has been well documented, it is not generally known that No. 38 (Transport) Squadron had been flying Dakotas from Tengah, in response to the Malayan Emergency, a week before Communist forces crossed the 38th Parallel. Equally little-known is that the Lincolns of No. 1 (Bomber) Squadron flew their first strikes against Communist targets in Malaya only three weeks after their more famous counterparts began strikes on the Korean Peninsula. No. 1 Squadron did not withdraw to Australia until July 1958, almost four years after No. 77 Squadron shipped its Meteors home to Australia. Even then, the Canberras of No. 2 Squadron and the Sabres of No. 3 Squadron flew operational sorties over Malaya for another 12 months.

When the added burden of introducing radically new equipment (helicopters and jet-powered combat aircraft) is taken into consideration, it can be appreciated that the 1950s were an interesting period of development for the RAAF. When considered in conjunction with the similar, if not more dramatic, evolution of Australia's Fleet Air Arm, this can be viewed as an important time in the development of air power in Southeast Asia. During this decade, the RAAF once again fought offshore, which undoubtedly provided valuable lessons to the strategic planners of the day, and stood the service in good stead to meet the further challenges of the 1960s.

Organisation

At the beginning of the 1950s, the RAAF was still structured largely as it had been in World War II, divided into five Area Commands. These Commands were organised along geographic lines, each with its own AOC, and reported to the Department of Air, via RAAF Headquarters at Victoria Barracks in Melbourne. As a rough guide, the operational units within each geographical area reported to that Command, and were arranged as follows:

Western Area – Western Australia. HQ RAAF Pearce. **Base:** Pearce
North-Western Area – Northern Territory and parts of northwest Western Australia. HQ RAAF Darwin. **Base:** Darwin
North-Eastern Area – Northern Queensland. HQ Townsville. **Base:** Garbutt
Eastern Area – New South Wales and Southern Queensland. HQ Glenbrook. **Bases:** Amberley, Archerfield, Williamtown, Richmond, Canberra, Rathmines
Southern Area – Victoria, South Australia and Tasmania. HQ Albert Park, Melbourne. **Bases:** Laverton, Point Cook, East Sale, Edinburgh

In theory, the squadrons at the above stations ('bases' from 1952) were then grouped into a number of wings, flying squadrons being identified with numbers from 1 to 299, base squadrons (the administrative core of the wing) from 300 to 399, and maintenance squadrons from 400 to 499. The base and maintenance squadrons were numbered to reflect their parent wing (e.g., No. 82 Wing's maintenance squadron was No. 482 Squadron), but the flying units retained their 'historical' identities.

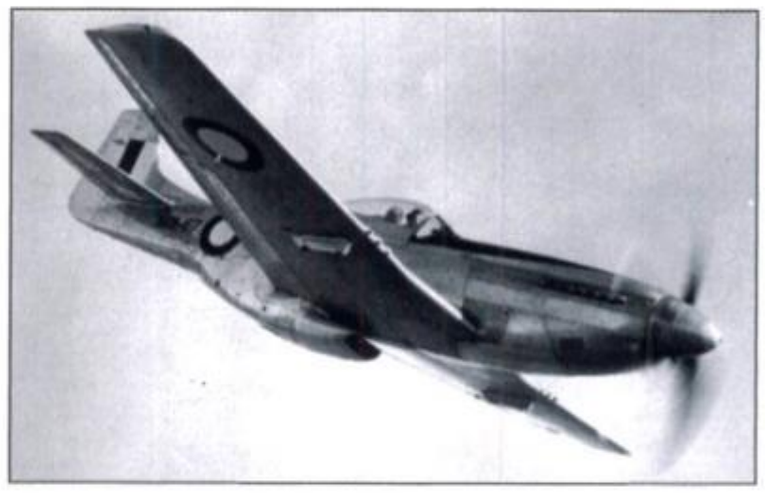
Not all squadrons were grouped into wings, however, and in January 1950 only No. 82 (Bomber) Wing and No. 86 (Transport) Wing were in existence. The remaining squadrons reported directly to the AOC of their respective Area Commands.

One major problem with this system was the division of command between the regions. It was this concern, together with the need to cope with the political changes of the times and to cater for the reduced number of units, which precipitated a fundamental change in thinking in the early years of the decade.

As part of the post-war rethinking, the RAAF's operational units were reorganised into two basic components: the Mobile Task Force, and the Home Defence Force. The former comprised virtually all the operational units, leaving the Home Defence Force (still organised around the Area Command system) responsible for air defence, maritime patrol and SAR duties in each squadron's area of operations. As such, Australian defence thinking in the 1950s entrusted the nation's defence to five Citizen's Air Force squadrons, equipped with obsolete aircraft, and the various training and support units around the country.

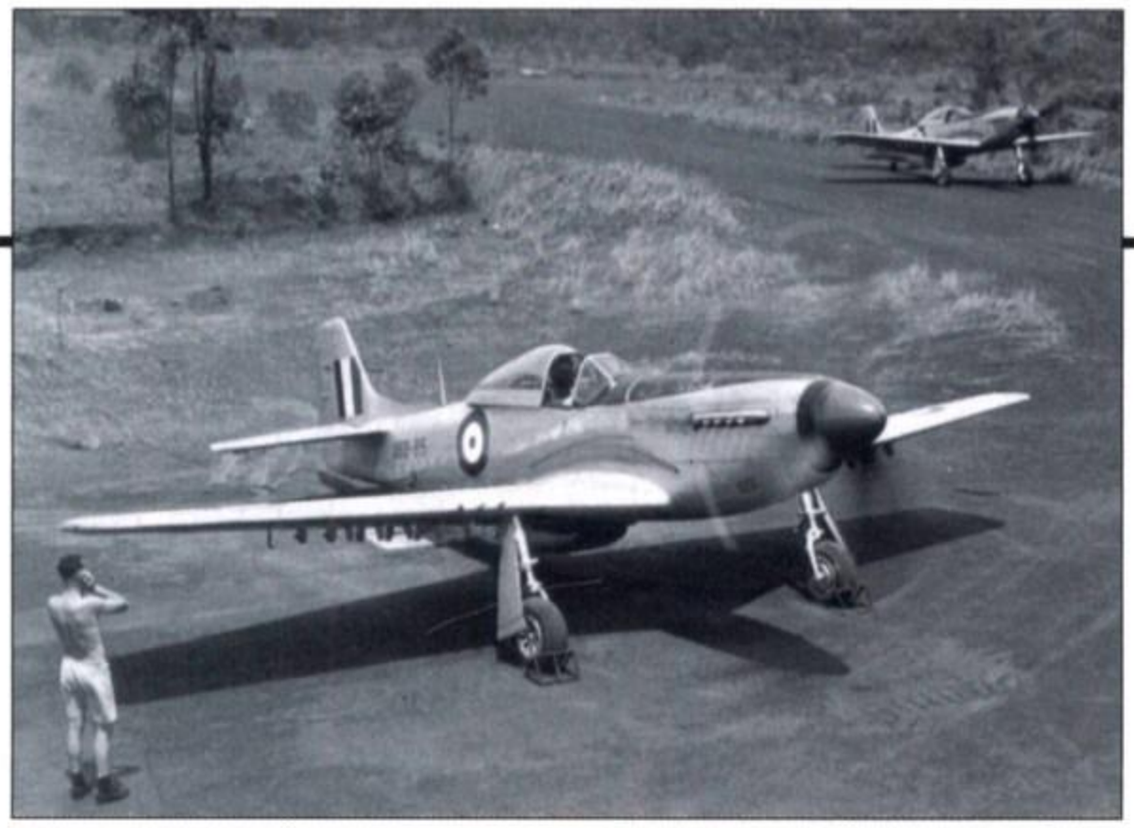
In October 1953, RAAF Headquarters was integrated into the Department of Air, and the remaining Areas of Command began to be replaced by Home Command (operational units), Training Command and Maintenance Command, a process that was completed in September 1954. The Department of Air began

The RAAF entered the 1950s with the Mustang and Lincoln as its primary combat equipment. The World War II Pacific two-tone roundel worn here slowly gave way to red/white/blue from 1947.



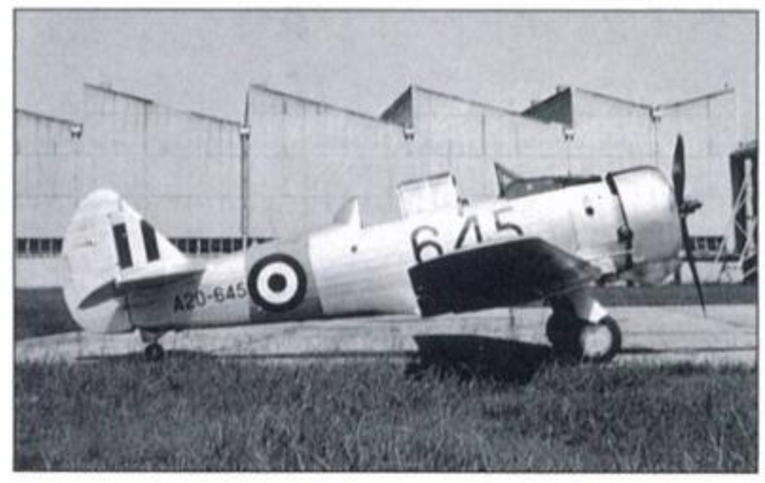
The first Australian-built Mustangs were CA-17 Mustang Mk 20s, with Packard V-1650-3 engines. Subsequent variants were the CA-17 Mk 22 (V-1650-3, reconnaissance), CA-18 Mk 21 (V-1650-7) and CA-18 Mk 23 (Rolls-Royce Merlin 70).

Above and below: As well as the 200 CAC-built aircraft, 215 P-51Ds and 84 P-51Ks were delivered from US stocks. These aircraft are seen in Japan as part of the BCOF (British Commonwealth Occupation Force).

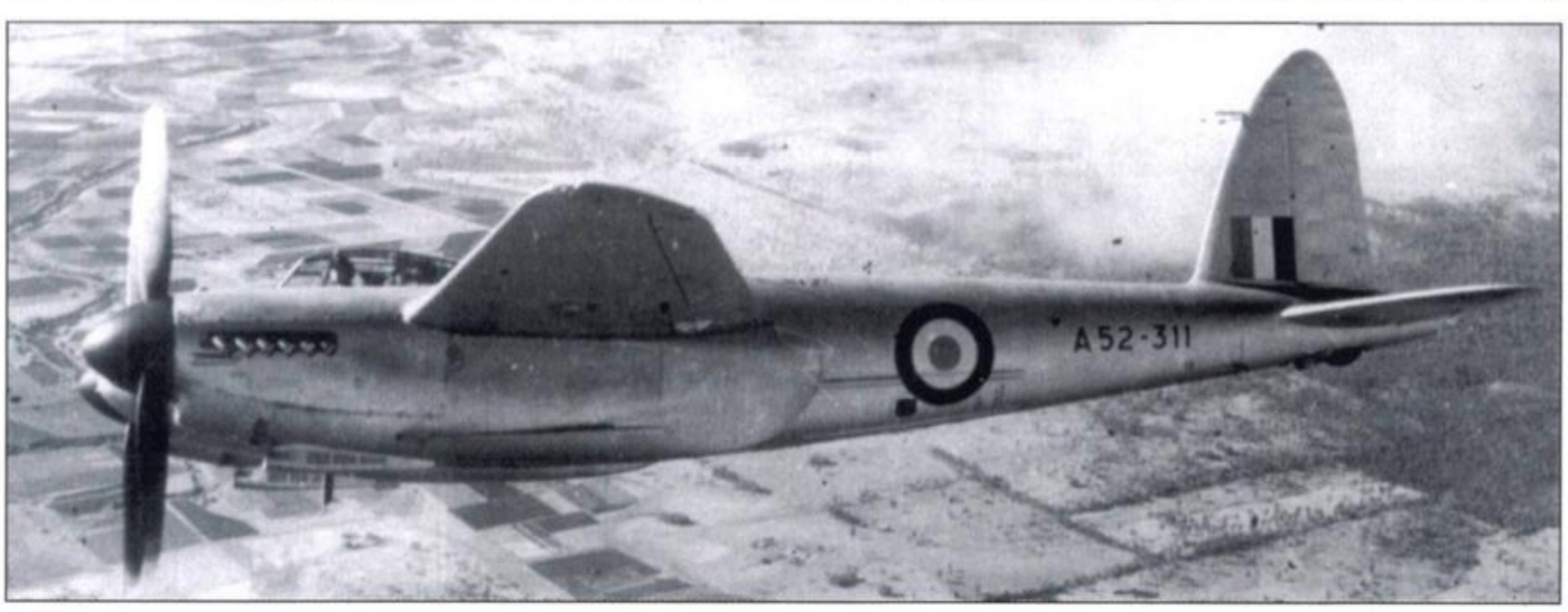


Left: CAC-built Mustangs are seen on exercise at Darwin with No. 3 Squadron. Note the underwing rocket rails.

Below: The Beaufighter Mk 21 soldiered on in the target-towing role with No. 30 Squadron until the unit's disbandment on 21 March 1956. After this, two 'Beaus' served with the Air Trials Unit at Woomera until December 1957.

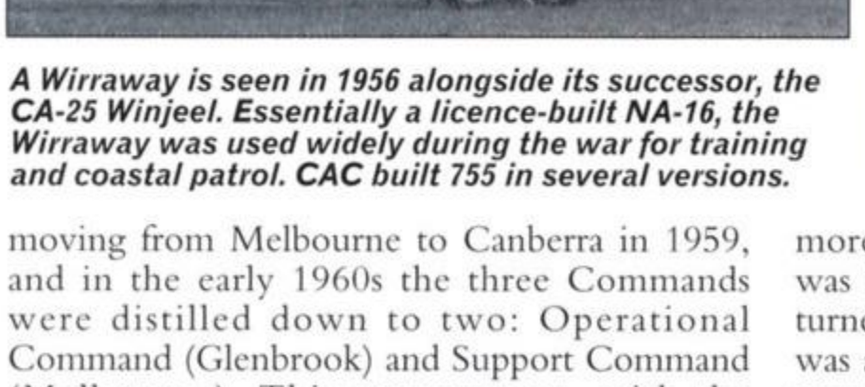


At the start of the 1950s the RAAF trainer fleet was based around the CAC Wirraway (above) and de Havilland Tiger Moth (below, many Australian-built). Both were phased out in the middle of the decade in favour of the Winjeel, which took over the basic training role with 1(B) FTS at Point Cook.



RAAF types 1950-1959

A4	Avro Anson
A8	Bristol Beaufighter (Australia)
A11	Auster AOP
A17	de Havilland Tiger Moth
A20	CAC Wirraway
A24	Consolidated Catalina
A52	de Havilland Mosquito
A65	Douglas Dakota
A68	North American/CAC Mustang
A73	Avro Lincoln
A76	Boeing Washington (on test)
A77	Gloster Meteor
A78	de Havilland Vampire (UK)
A79	de Havilland Vampire (Australia)
A80	Sikorsky S-51
A81	Bristol Freighter
A82	Vickers Viking
A83	de Havilland Sea Hornet (on test)
A84	EECo/GAF Canberra
A85	CAC Winjeel
A86	Hawker P.1081 (order cancelled)
A87	Vickers Valetta (on test)
A88	RFD Winged Target (not serialled)
A89	Lockheed Neptune
A90	Percival Prince
A91	Bristol Sycamore
A92	GAF Jindivik
A93	GAF Pika
A94	CAC Sabre
A95	de Havilland Canada Beaver
A96	Convair 440
A97	Lockheed Hercules
A98	Cessna 180



A Wirraway is seen in 1956 alongside its successor, the CA-25 Winjeel. Essentially a licence-built NA-16, the Wirraway was used widely during the war for training and coastal patrol. CAC built 755 in several versions.

Above and below: The Mosquito PR.Mk 41 served with No. 87 Squadron until 1953. The line-up below includes No. 3 Squadron Austers and No. 30 Sqn Beaufighters.

moving from Melbourne to Canberra in 1959, and in the early 1960s the three Commands were distilled down to two: Operational Command (Glenbrook) and Support Command (Melbourne). This arrangement, with the exception of the Department of Air being merged into a unified Department of Defence, still exists today.

A decade of change

Australia began the 1950s firmly in the British sphere of influence, though experience during World War II had shown that American assistance and involvement was becoming ever more important. By the end of the decade it was largely to the latter country that Australia turned for its defence needs. The Asian region was also becoming more relevant, and Australia was to be drawn into one war (Korea) and an 'emergency' (Malaya) during the next 10 years, with a 'confrontation' (Indonesia) to loom in the early years of the next decade.

Problems with the supply of aircraft during World War II, particularly from Britain, necessitated the rapid growth of the Australian aircraft manufacturing industry, and by war's end such types as the Tiger Moth, Beaufighter, Beaufort, Mosquito and Mustang had been built by local factories. To this, of course, must be added the indigenous Commonwealth Aircraft Corporation Wackett Trainer, Wirraway and Boomerang. Plans to build a heavy bomber in Australia took longer to mature, but the first of an eventual 73 Lincoln Mk 30/30A aircraft was rolled out from the Government Aircraft Factories' Fishermans Bend plant, near Melbourne, on 8 February 1946.

The Lincoln, together with the CAC-built Mustang, was still in production at the beginning of 1950, the 200th and final Mustang delivery coming in 1951, and the last Lincoln being completed in 1953. By the time the final

RAAF ORDER OF BATTLE, 1 JANUARY 1950

UNIT	EQUIPMENT	RÔLE	BASE
No. 1 Squadron	Lincoln	heavy bomber	Amberley, Queensland
No. 2 Squadron	Lincoln	heavy bomber	Amberley, Queensland
No. 3 Squadron	Mustang, Wirraway, Auster III	tactical reconnaissance	Fairbairn, ACT
No. 6 Squadron	Lincoln	heavy bomber	Amberley, Queensland
No. 10 Squadron	Lincoln	general reconnaissance	Garbutt, Queensland
RAAF Garbutt renamed RAAF Townsville January 1951			
No. 11 Squadron	Catalina	general reconnaissance	Rathmines, NSW
only two Catalinas remaining, with No. 11 Squadron Darwin Det., both withdrawn by 04/50			
No. 11 Squadron relocated to Amberley in November 1950, and re-equipped with Lincoln Mk 30s			
No. 21 Squadron	Mustang, Wirraway, Tiger Moth	CAF	Laverton, Victoria
No. 22 Squadron	Mustang, Tiger Moth	CAF	Schofields, NSW
No. 23 Squadron	Mustang, Wirraway, Tiger Moth	CAF	Archerfield, Queensland
No. 25 Squadron	Mustang, Wirraway, Tiger Moth	CAF	Pearce, Western Australia
No. 30 Squadron	Beaufighter 21	target towing	Schofields, NSW
No. 34 Squadron	Bristol Freighter, Prince, Viking, Dakota, Anson, Auster	communications	Mallala, South Australia
No. 36 Squadron	Dakota	transport	Richmond, NSW
No. 38 Squadron	Dakota	transport	Richmond, NSW
No. 38 Squadron relocated to Changi, Singapore in June 1950			
No. 75 Squadron	Mustang	fighter	Williamtown, NSW
No. 76 Squadron	Mustang	fighter	Williamtown, NSW
No. 77 Squadron	Mustang	fighter	Iwakuni, Japan
No. 77 Squadron also operated from Pohang, Yonpo and Pusan during 1950 as part of UN operations during the Korean War			
No. 87 Squadron	Mosquito	photo reconnaissance	Canberra, ACT
ARDU	various	trials	Laverton, Victoria
Governor General's Flt	Dakota	VIP transport	Canberra, ACT
Governor General's Flight duties taken over by VIP Flight, No. 36 Squadron with Dakotas from 10/50			
CFS	Dakota, Lincoln, Mustang, Wirraway, Tiger Moth	instructor training	East Sale, Victoria
1 FTS	Tiger Moth, Wirraway	basic training	Point Cook, Victoria
SAN	Dakota, Lincoln	navigator training	East Sale Victoria

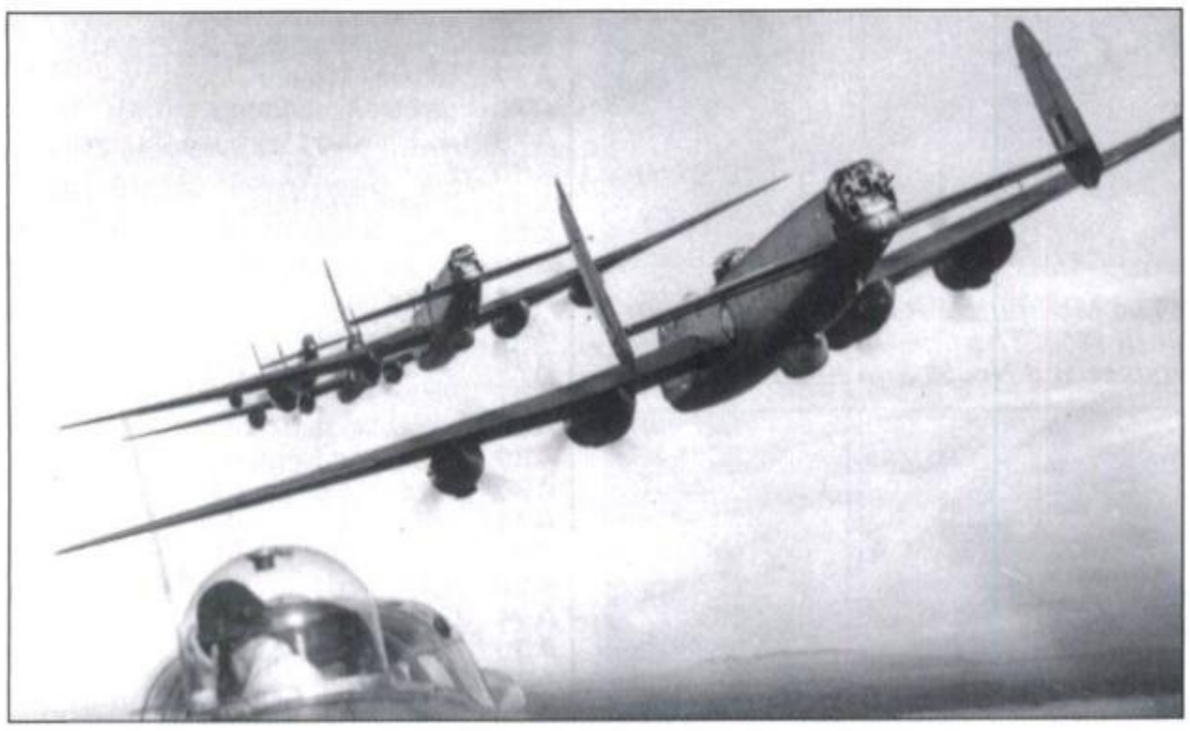
Operational squadrons reported to the respective Area Command AOC (Western, North Western, North Eastern, Eastern and Southern), however some units were also organised into wings, as follows:

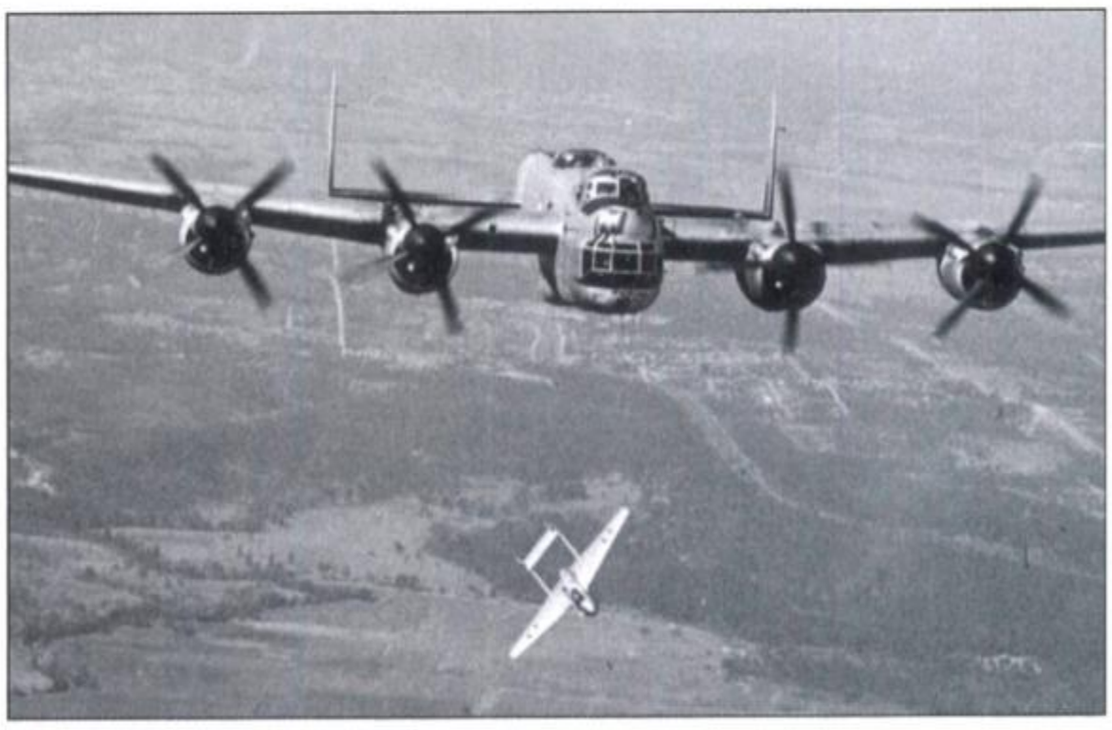
No. 82 (Bomber) Wing – Amberley – Nos 2 and 6 Sqns
No. 86 (Transport) Wing – Richmond – Nos 36 and 38 Sqns
No. 90 (Composite) Wing – Tengah – Nos 1 and 38 Sqns (not formed until July 1950)
No. 91 (Composite) Wing – Iwakuni – Nos 36 and 77 Sqns (not formed until October 1950)

Above and right: GAF flew the first Lincoln Mk 30 of five assembled from British-supplied parts on 17 March 1946. A further 19 wholly Australian-built Mk 30s and 49 Mk 30A/31s followed.

Below left: Taken from the mid-upper turret of the no. 4 aircraft, this photograph shows No. 82 Wing aircraft engaged in formation work.

Below: A Vampire, probably from No. 23 Squadron, engages in mock attacks against a Lincoln Mk 30.





Mustang was delivered, the type was already obsolete (No. 77 Squadron in Korea having already converted to the Gloster Meteor).

The Lincoln remained in service until June 1961, thanks to a new lease of life as a maritime reconnaissance platform – by way of unique Australian modifications. These stemmed from a 1949 requirement for an ASW/anti-shipping/general reconnaissance platform to replace the Catalina. Centre of gravity problems caused by the installation of mission equipment were solved by extending the nose 6 ft 6 in (1.98 m), in the process ruining the elegant lines of the Lincoln. The first general reconnaissance (GR) Mk 31 conversion entered service in March 1953 with No. 10 Squadron, and 19 Mk 30A bombers were so converted. The further conversion of 10 GR.Mk 31s to MR.Mk 31 standard began in 1955, and involved a radar upgrade (from ASV Mk 7 to ASV Mk 7A) and various modifications to better match the airframe to the maritime reconnaissance role. Even this was a stopgap measure, however, as No. 10 Squadron's sister unit, No. 11 Squadron, had been operating the purpose-designed Lockheed P2V-5 Neptune since November 1951. No. 10 Squadron soldiered through the decade before taking delivery of its first P2V-7 in March 1962.

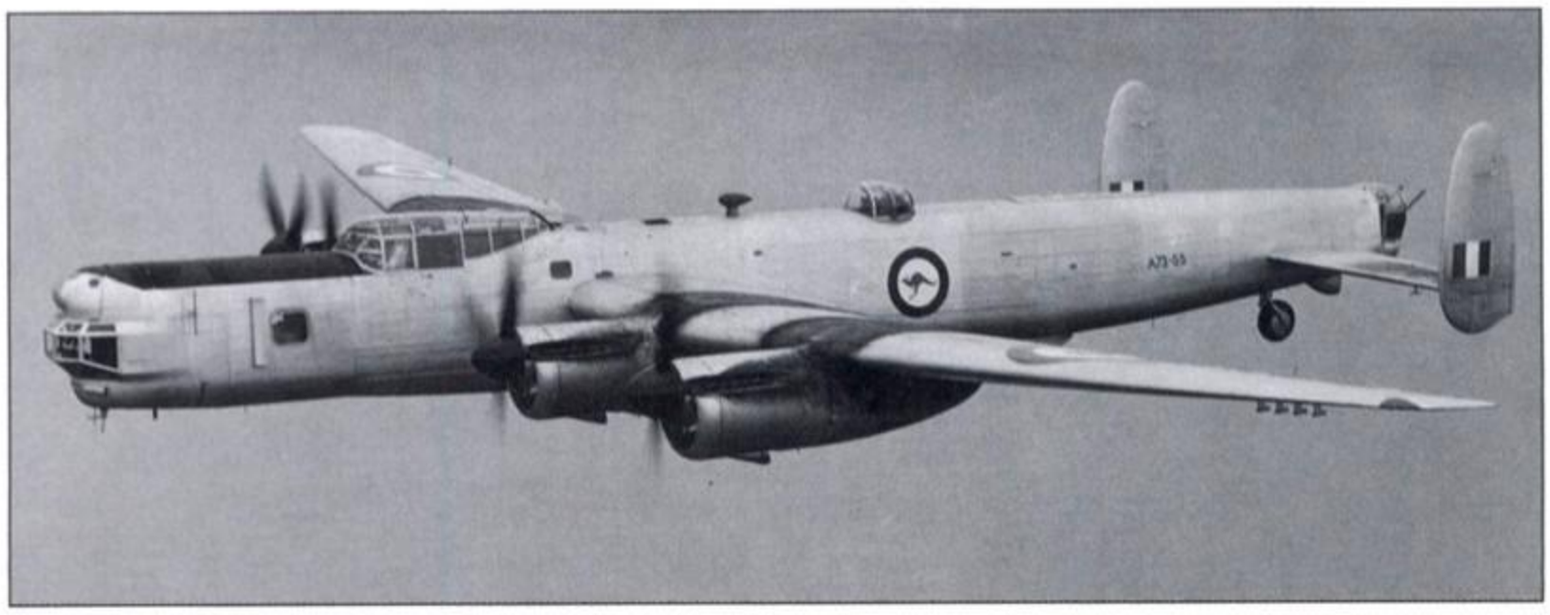
Naturally, the acquisition of jet-powered aircraft had been pursued in the post-war years, beginning with the loan of Meteor F.Mk 3 A77-1 (ex-EE427) from Britain in May 1946, and by 1950 the de Havilland Vampire was in production, in Australia, for the RAAF.

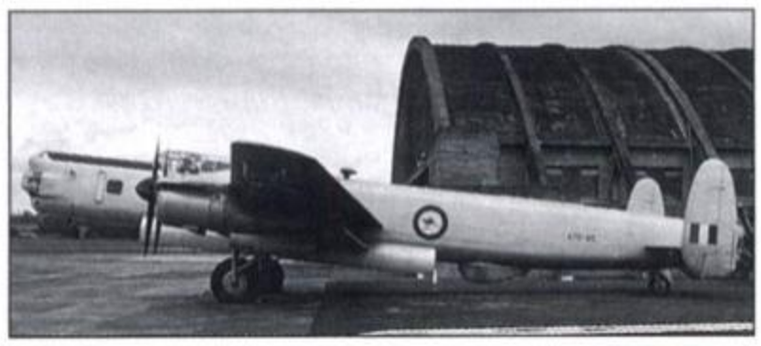
Vampire selected

Selection of the Vampire as the future fighter for the RAAF had been announced in September 1946, with an initial order for 50 Rolls-Royce Nene-powered F.Mk 30 aircraft to be built by de Havilland Australia at Bankstown. This order was increased to 80 in August 1950, the final 23 of which emerged as the FB.Mk 31 (a modification to the original

By the start of the 1950s only two Catalinas were left in service, flying with the Darwin detachment of No. 11 Squadron. By April 1950 both had been retired in favour of Lincoln Mk 30s.

Right: At the start of the 1950s standard Lincoln Mk 30s served in the general (coastal) reconnaissance role with Nos 10 and 11 Squadrons. While No. 11 Sqn adopted the Neptune, No. 10 Squadron received the extended-nose Mk 31 conversion from 1953. Ten were later further upgraded to MR.Mk 31 standard.



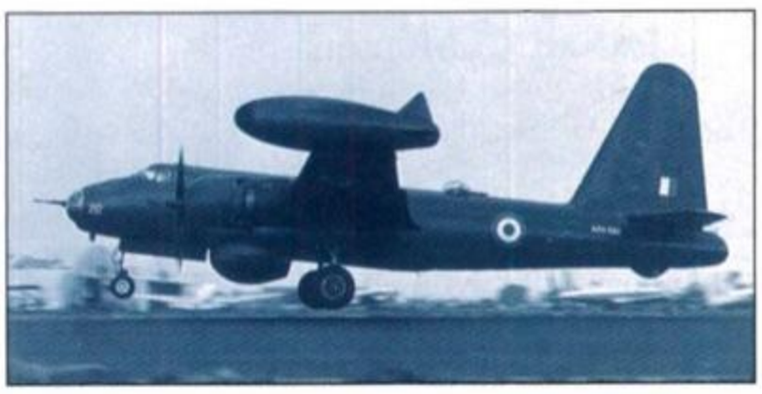


Above and below: The Lincoln Mk 31's nose extension offset C of G problems caused by additional mission equipment. Note the additional window (with airflow baffle) in the side of the nose extension.

Above: Flying near its base at Richmond, this P2V-5 Neptune served with No. 11 Squadron.

Right: In 1959 the Neptune fleet was converted to P2V-5F standard, with MAD boom in the tail and lengthened turretless nose.

Below: The original P2V-5 configuration had a short nose with 20-mm cannon fitted in a turret.

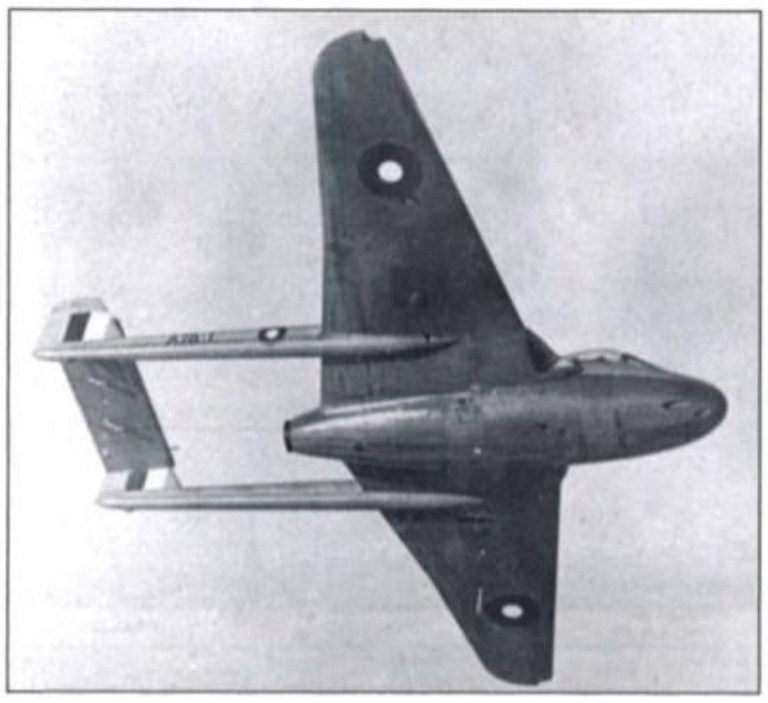


design to also accommodate the ground attack role). An additional 24 F.Mk 30s were retrospectively modified to this standard, and a further redesign (known as the FB.Mk 32) was mooted. In the event, only two F.Mk 30s were modified to this standard, and the idea was not pursued. To this total of single-seat aircraft should be added three British aircraft (one each F.Mk 1, F.Mk 2 and FB.Mk 5) imported between 1947 and 1949 to act as test and trials aircraft for the Vampire programme.

The first flight of an Australian Vampire occurred on 29 June 1949, and the aircraft was handed over to the RAAF the following September. No. 78 Wing (Nos 75 and 76 Squadrons) at Williamtown was the recipient of early production examples, but by 1951 aircraft were arriving at Laverton to re-equip No. 21 (Citizen's Air Force) Squadron. No. 78 Wing relocated to Malta between 1952 and 1954 (detailed below), and re-equipped with leased Vampire FB.Mk 9s. During this period, as a result of the division of the RAAF into Mobile Task Force and Home Defence Force components, the only jet-equipped RAAF fighter units available to defend Australia were the Vampire-equipped Nos 21, 22 and 25 Squadrons.

Australian production of the Vampire was soon expanded to include the two-seat trainer, beginning with an order for 36 Goblin-powered T.Mk 33s for the RAAF, and five (essentially similar) T.Mk 34s for the Navy, in October 1951. A later development, known as the T.Mk 35 and featuring ejection seats, blown canopy, revised rudder shape and increased fuel capacity, was introduced from 1957. A total of 68 T.Mk 35s, one equivalent T.Mk 34A for the Navy, and one prototype conversion from a T.Mk 33 emerged from the de Havilland Australia production line. The surviving earlier standard T.Mk 33/T.Mk 34s were modified to T.Mk 35A and T.Mk 34A, respectively, beginning in 1957 and ending in 1960.

It was always envisaged that a second, more capable, type would supplant the Vampire in



Above: The first Australian jet fighter, A78-1 was a Nene-powered Vampire F.Mk 2 taken on ARDU charge in January 1949. British-built Vampires received the type designation A78.

Right: No. 77 Squadron Meteors are lined up at Iwakuni in 1951, shortly before the unit re-entered the Korean War after re-equipment.

Left: Along with single-seaters, DHA produced 110 two-seat Vampires, including six for the navy. This T.Mk 35 flew with the Central Flying School at East Sale.

Below: De Havilland Australia-built Vampires were designated A79, this being the first.

RAAF markings and, after several types had been considered, an order for 72 Hawker P.1081s (52 for air defence and 20 for tactical reconnaissance, to be built by CAC) was announced in February 1950. Deliveries were to have commenced the following July, but the project was cancelled by the British manufacturer after RAF interest evaporated. This left Australia with no immediate alternative, and led to the stopgap acquisition of the Gloster Meteor (as a matter of some urgency) to replace the Mustangs serving in Korea.

Eventually, a version of the North American F-86F Sabre was chosen, powered by the Rolls-Royce Avon engine (conferring some commonality with the Canberra) and armed with two ADEN cannon. Again, CAC was to build the aircraft, as the CA-26 (prototype) and CA-27. Much redesign work was needed to incorporate the necessary changes, not least of which was the deepening of the forward fuselage to provide a larger inlet area for the Avon.

The first flight of the prototype came on 3 August 1953, the first production CA-27 Mk 30 (A94-901) was delivered just over a year later, on 18 August 1954, and the type finally entered squadron service with No. 75 Squadron in April 1955. Twenty-two aircraft were delivered before production switched to the Mk 31, fitted with the so-called '6-3' wing leading edge to improve manoeuvrability at altitude. Twenty Mk 31s were completed, and surviving Mk 30s were progressively brought up to this standard, before production again switched to an improved model.

The final variant, the Mk 32, benefited from a more powerful Avon engine and four underwing pylons, instead of two on the earlier marks. Sixty-nine Mk 32s were completed, the last one rolling off the production line in the middle of 1961, bringing the total number of Australian-built Sabres to 111.

Initially equipping No. 2 OTU (later, No. 2 OCU) at Williamtown, the Sabre went on to serve with No. 78 Wing (Nos 3, 75, 76 and 77 Squadrons). No. 76 Squadron had been disbanded shortly after No. 78 Wing's return from Malta, and had to wait until reformation in 1960 before receiving its aircraft.

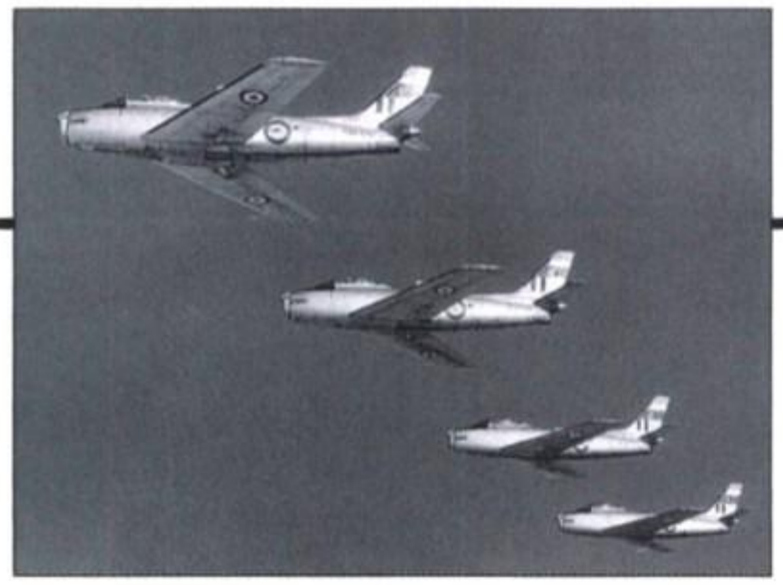
Major shortcomings were the lack of radar and (initially) air-to-air missile capability. The former problem was never resolved, the RAAF having to wait until the introduction of the Mirage IIIO in 1963 for an all-weather fighter. Although the two 30-mm ADEN cannon were a vast improvement over the internal armament of USAF Sabres, the CA-27 was already becoming obsolete in world terms, and an air-to-air missile acquisition was sought by the RAAF. Trials with the de Havilland Firestreak missile were carried out at Woomera during 1956 and 1957, but it was not until 1960 that such a capability was finally introduced, with the acquisition of the AIM-9B Sidewinder.

Australian interest in a jet bomber to replace the Lincoln also began in the early post-war period, and Cabinet approval for the purchase of 48 Canberra aircraft, to be built by GAF, came in January 1950. The aircraft was initially to be powered by the Rolls-Royce Tay, but abandonment of that engine by the manufacturer dictated an early switch to the Rolls-Royce Avon.

Australian Canberras

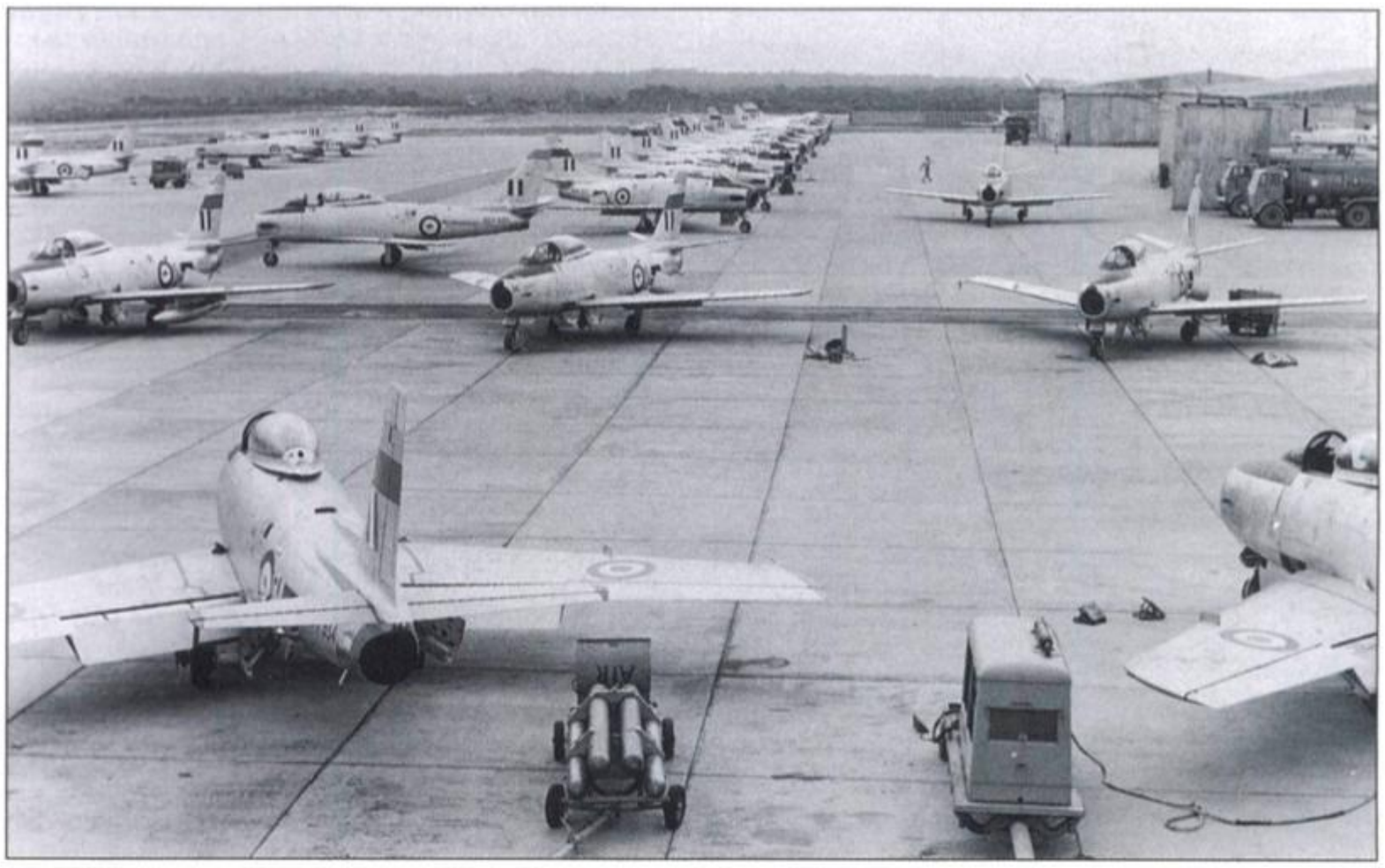
The Australian Canberra was closely based on the RAF B.Mk 2 and was known as the Mk 20. To assist in the programme development, two B.Mk 2s were imported from Britain in 1952 and (later modified as Mk 21 trainers) operated alongside their GAF-built counterparts until the very end of RAAF Canberra operations in 1982. It had been planned that the mission equipment would include the H2S Mk 9 bombing radar (permitting all-weather operations), but Britain declined to make it available and the aircraft were delivered with only a visual bombsight.

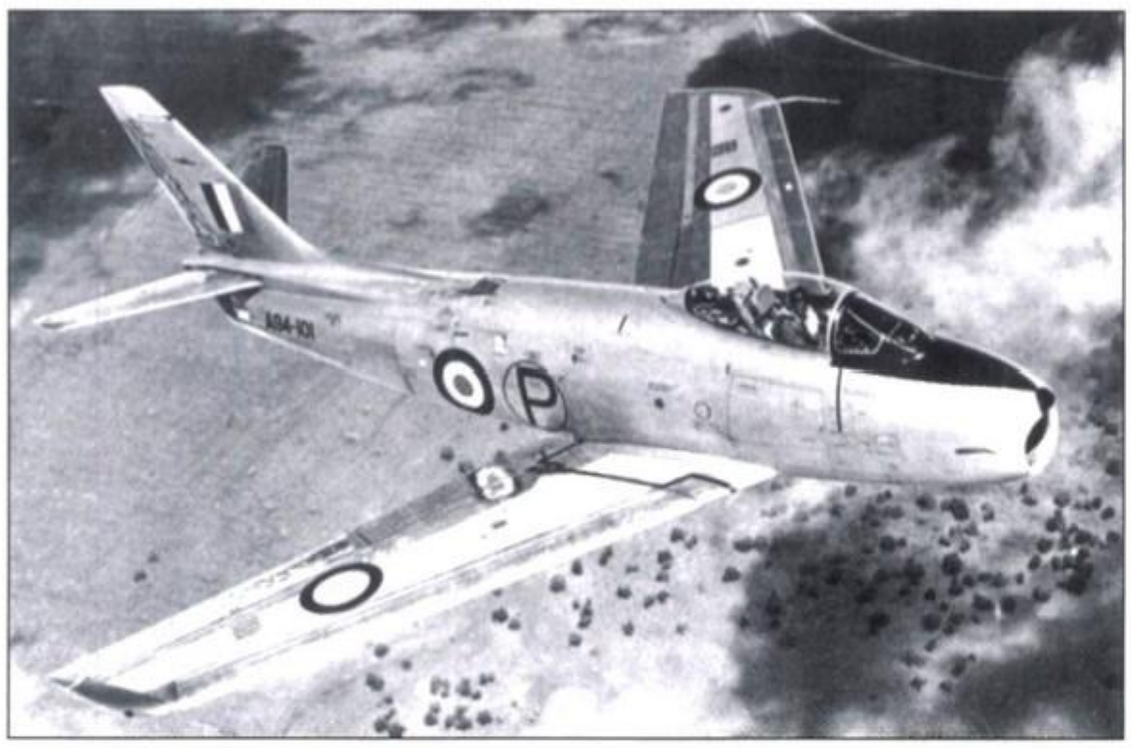
After several delays in the production programme, the first Australian aircraft made its maiden flight from the government airfield at Avalon on 29 May 1953, deliveries to the RAAF commencing later the same year. Amberley's No. 82 (Bomber) Wing was the natural choice for the parent Canberra unit, and initial deliveries were to No. 2 Squadron, with No. 6 Squadron beginning conversion in 1955 and No. 1 Squadron finally following suit in 1958. The latter unit did not return home to



CA-27 Sabres in service: above is a quartet of No. 2(F) OCU aircraft, while aircraft from the same unit mingle with the orange-striped aircraft of No. 3 Squadron on a Williamtown ramp (right). The badge carried by some aircraft above the fin-flash is that of CAC. Below is an ARDU machine.

Below: A94-101, the prototype Avon-Sabre, was also the only CA-26. It first flew at Avalon on 3 August 1953, piloted by Flt Lt W. Scott.





The Canberra entered service in 1953 to begin the replacement of the Lincoln. This aircraft is one of five British-built B.Mk 2s to be received.

Below: Four Canberra Mk 21s of No. 1(B) OCU bask in the Queensland sun at Amberley. The RAAF trainer version was produced by conversion of two ex-RAF B.Mk 2s and five early production B.Mk 20s.

Above: Canberra B.Mk 20s are seen undergoing final assembly in the GAF facility at Avalon.

Australia until July 1958, after eight years of Lincoln operations in Malaya.

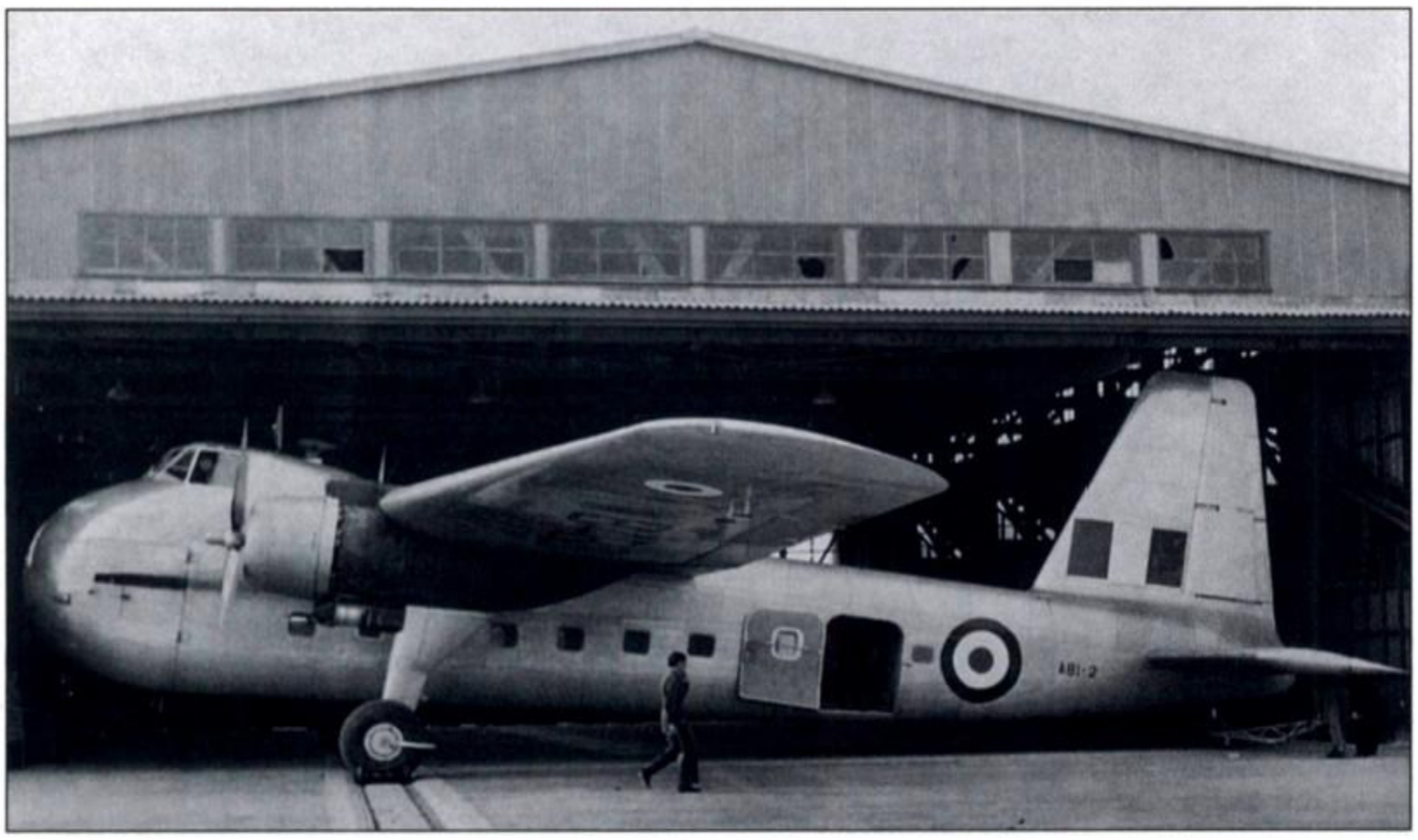
The first 27 aircraft were powered by the RA.3 Avon Mk 1 engine, but from the 28th machine the more powerful RA.7 Avon Mk 109 engine was introduced. Its extra 1,000 lb (4.44 kN) of thrust provided a much-welcomed safety margin in the hot weather conditions encountered by the type throughout its service career.

Soon after deliveries began, an opportunity was taken to test the new machine with the entry of three aircraft in the October 1953 air race between London and Christchurch. Under the auspices of the Aircraft Research and Development Unit (ARDU), No. 1 Long Range Flight was formed at Laverton in April 1953, initially taking delivery of the two B.Mk 2s for training. It was intended to utilise the first two Australian aircraft, but one of the British aircraft was entered as an insurance against the late delivery of either of the GAF examples. In the event, it was not required, and the two GAF aircraft (A84-201/202), fitted with long-range tanks in the bomb bays, departed London with the rest of the race field; A84-201 gained a creditable second place behind RAF PR.Mk 3 WE139. The second aircraft, unfortunately, did not complete the course, after a blown tyre upon landing on Cocos Island forced a premature withdrawal.

Canberra into action

A more serious test occurred in July 1958, when No. 2 Squadron relocated to the newly-rebuilt RAF Butterworth as part of the Commonwealth Strategic Reserve. The unit was soon in action, carrying out strikes against Communist Terrorist (CT) positions in the final months of Operation Firedog. In 1967 it relocated to Phan Rang to participate in the war against North Vietnam. The squadron did not finally return home to Australia until 1971.

After the introduction of the Canberra into service, several early accidents were attributed to mishandling and it became apparent that a dual-control variant was necessary. As a result, two T.Mk 4 aircraft were acquired from Britain, arriving in the middle of 1956. Five early Mk 20 aircraft (with the lower-powered engine) and the two B.Mk 2s were fitted with a



Left: A Dakota from No. 36 Squadron's VIP Flight awaits its passengers at RAAF Canberra. In the background are Mustangs from No. 3 Squadron.

Right: The Dakota was the workhorse of the RAAF's transport effort throughout the 1950s. No. 86 Transport Wing was based at Richmond with Nos 36 and 38 Squadrons, although No. 38 was detached to Changi. Dakotas were also based in Japan to support the Korean effort.

Four Bristol Freighter Mk 21Es were purchased for 2 ATU based at Edinburgh. The aircraft at left is seen mounted on a traverser which allowed it to be slid sideways into the Parafield hangar.

second set of flying controls. These converted machines, Australian and British, became known as the Mk 21, and were completed between 1958 and 1960. The Mk 21s were operated by No. 1(B) OCU, which was formed for this training purpose at Amberley in January 1959, and the two T.Mk 4s went to the Central Flying School at East Sale to be used for instructor training.

Local design of aircraft types had not been dormant throughout this period, and two significant types emerged from the drawing boards at Fishermans Bend in the 1950s. The first was the CAC Winjeel, designed in response to an early post-war RAAF requirement for a replacement for a miscellany of existing training types. The initial design was known as the CA-22, and was to have been powered by an indigenous engine, the 450-hp (335-kW) CAC Cicada.

Two CA-22 prototypes were built, powered by licence-built Pratt & Whitney R-985 Wasp Juniors because the Cicada never entered production (all production aircraft were fitted with the American engine). The first flight of the prototype (A85-618) was on 3 February 1951, with the second aircraft following in July of the same year. A production order for 62 aircraft was signed with the RAAF in November.

The development of the Winjeel was a drawn-out affair, caused for the most part by the length of time required to correct early handling defects, the most serious of which was the aircraft's reluctance to spin. Eventually, the problems were cured by making the fin higher and moving it forward to a position ahead of the horizontal stabiliser leading edge, and lengthening the fuselage ahead of the windscreen.

With these changes incorporated, the production aircraft became known as the CA-25; the first example flew on 23 February 1955, being delivered to the RAAF later that year. Production came to an end with the delivery of the last aircraft in January 1958. By then, the aircraft had earned itself a reputation for simplicity and durability, and served the RAAF well until its final withdrawal from use (as a forward air control aircraft) in 1995.

The second indigenous type, perhaps even more esoteric, was certainly more successful in terms of numbers built, being exported to three countries and remaining in production into the 1990s. The GAF Jindivik pilotless aircraft was first mooted in 1948, following meetings between the Australian Department of Supply and Development and its British equivalent, the Ministry of Supply. The requirement was for a small, high-speed pilotless target aircraft, and the initial contract covered the construction of two manned (Project 'C'), and six unmanned (Project 'B') aircraft, powered by the Armstrong Siddeley Adder ASA.1 turbojet.

Piloted first flight

The first piloted aircraft, known as the GAF Pika, initially flew on 31 October 1950, and the two manned examples were used to verify the general characteristics of the design. Today, one example of the only Australian (piloted) jet aircraft survives at the RAAF Museum, Point Cook.

The first Jindivik Mk 1 flew on 28 August 1952, and shortly thereafter began trials at the Woomera range. This initial variant was superseded by the Armstrong Siddeley Viper-powered Mk 2 after 12 units had been completed, and the aircraft was eventually built in four major marks, culminating in a batch of 18 aircraft for the British MoD in 1997. In addition to the RAAF and MoD, the Jindivik was sold to the RAN, US Navy and Swedish air force.

In 1954 a Defence Air Mission toured the United States and Great Britain, looking at types to fulfil Australia's defence needs of the future. High on the list of priorities was an aircraft to replace the (by now limited-capacity) Dakota, for experience in Korea and Malaya had highlighted the shortage of RAAF airlift capability. After studying several types, the mission recommended the purchase of 12 C-130A Hercules. This order marked the first export contract for the Hercules, and once again Australian defence planners had picked the right aircraft for the task at hand. The first five aircraft touched down at Richmond on delivery to No. 36 Squadron on 13 December 1958, and immediately bestowed an enormous boost in capability on the transport force. These 12 Hercules were the forerunners of an eventual 48 (at the time of writing, in early 2000) to serve with the RAAF.

Perhaps the only areas in which the service dragged its heels were the all-weather air defence and strike roles and the rotary-wing field. As mentioned earlier, the RAAF had no radar-equipped fighters (even the Canberra was really a straight and level, daylight-only, visual bomber), and the main priorities at the end of the decade focused on this fact. Far-reaching decisions were to be made in the early 1960s that would see the Mirage III and (ultimately) F-111 carry the kangaroo roundel.

As for helicopters, only five were acquired during the decade, none of which saw operational service. A single Sikorsky S-51 had been brought on charge as far back as 1947, two others being added in 1951 and, after short careers with ARDU, all were passed on to Citizen's Air Force units. A pair of Bristol Sycamores was acquired in 1951, and also served with ARDU before being passed on to No. 1 Air Trials Unit at Woomera. It would not be until October 1962 that the RAAF received helicopters for anything more than trials and testing, with the arrival of the first Bell UH-1B Iroquois.

By the end of the decade, the RAAF had developed from a somewhat emaciated Commonwealth Air Force to a significant force in Southeast Asia (aforementioned shortcomings aside), and had absorbed the necessary new technologies and tactics along the way to remain so throughout the 1960s. Just as importantly,

The RAAF became the first export customer for the Lockheed Hercules, purchasing 12 C-130As to equip No. 36 Squadron at Richmond. The fin panels were in Dayglo.

Above: Australian SAS paratroops drop from a No. 36 Squadron C-130A during a SEATO exercise (Ligtas) in the Philippines.

The CAC CA-25 Winjeel underwent a protracted development. Below is the prototype (CA-22) seen in later form with its fin moved forward, while above is a service machine.

Above and above left: Two Convair 440s (A96-313 and A96-353) were acquired for VIP/staff transport duties. They served with Canberra-based No. 34 Squadron.

Below: Winjeel A85-424 performs for the camera. The aircraft wears the standard later trainer scheme of silver dope with Dayglo patches on the engine cowling, wingtips and fin.

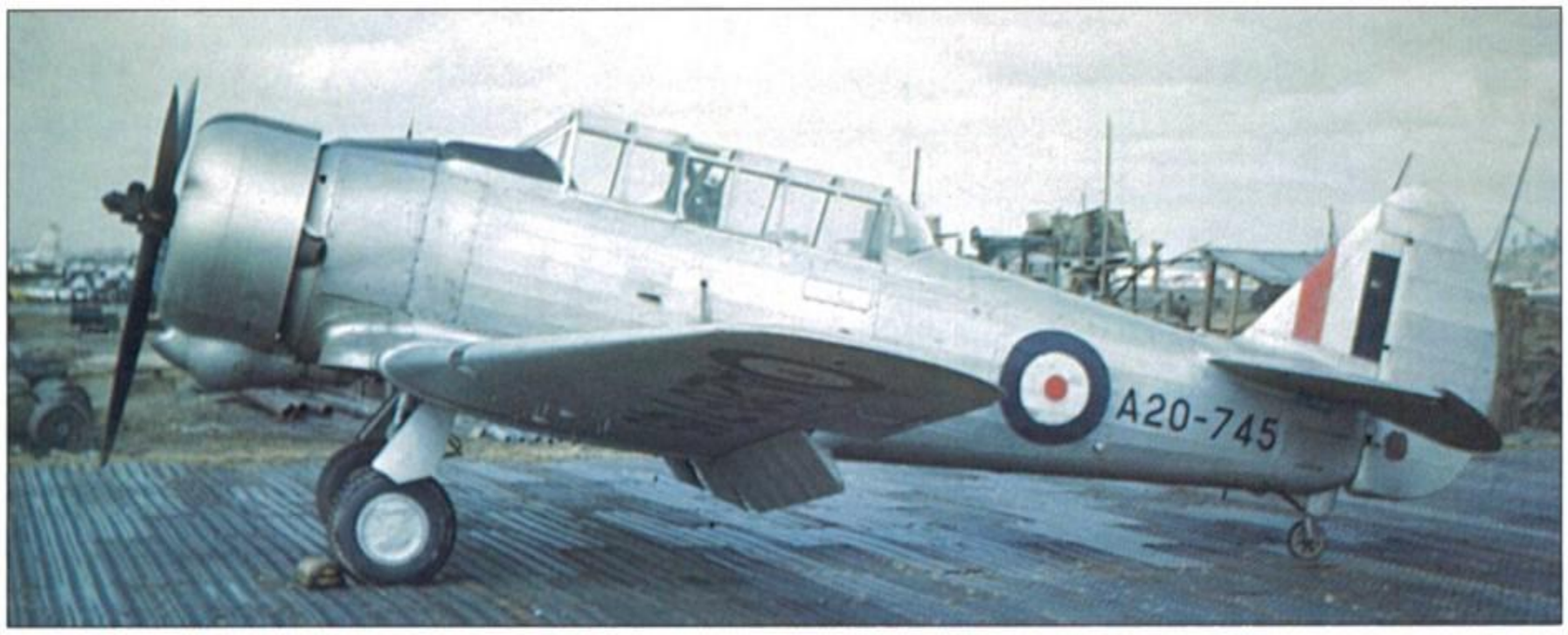
Australian industry had kept pace and over the following 10 years would construct modern types such as the Mirage and Macchi MB.326 to assist in the provision of Australia's security.

Korea

In the aftermath of World War II, as a direct result of the agreement by the Allies to place Japan under military occupation for five years, the Australian government decided to contribute air, land and sea forces to the British Commonwealth Occupation Force (BCOF).

No. 77 Squadron used both US-built P-51Ds and CAC-built CA-18 Mk 23s in Korea. This is one of the latter, displaying the tricoloured spinner adopted by the squadron. These Mustangs are seen at Iwakuni in Japan in April 1951, having been retired from the fray.

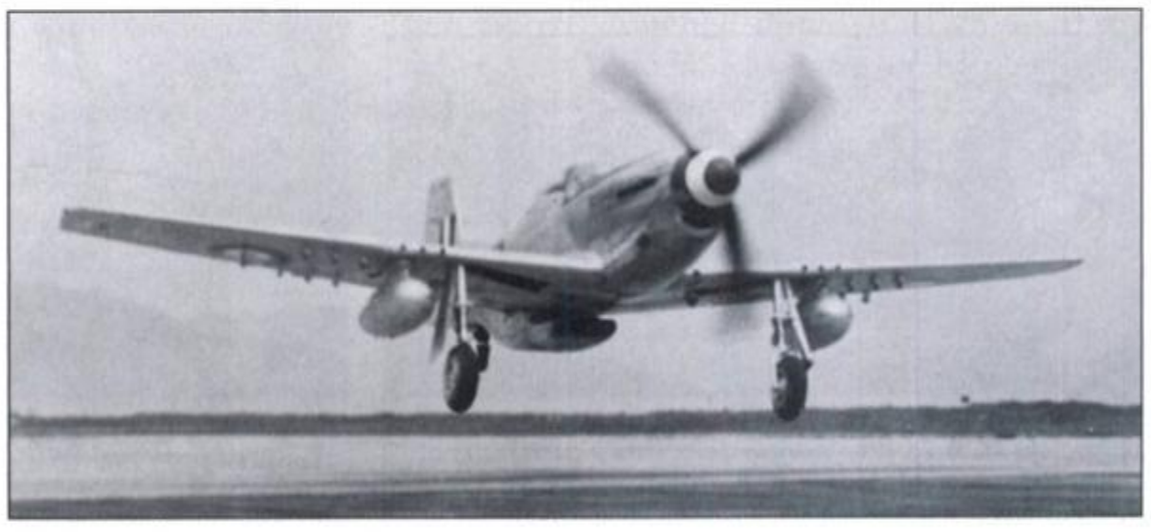
Having flown its first combat missions direct from Iwakuni, No. 77 Squadron began to use Taegu as a staging post for rearming and refuelling, greatly increasing the Mustang's effectiveness and allowing it to range right up to the Russian border. In October the unit moved permanently to Pohang.



Left: A handful of CAC Wirraways was assigned to the RAAF detachment in Japan, acting as general 'hacks'. This aircraft is seen at the USAF base at Itazuke in the summer of 1950.

Right: No. 77 Squadron's Mustangs run up on the ramp at Taegu prior to a late January 1951 mass attack made in concert with USAF 35th Fighter-Bomber Group F-51s. The aircraft are carrying a pair of napalm tanks each, with underwing rockets. The Chinese advance, which had nearly engulfed the south, had just been halted, and strikes such as this one were vital to consolidate what little territory was still in UN hands.

By November 1950 RAAF Mustangs were operating from forward operating bases north of the 38th parallel. Here a pilot is greeted at one such location by members of the USAF's 6150th Tactical Support Wing.



An RAAF Mustang takes off from Iwakuni for a strafing mission into North Korea in July 1950. No. 77 Squadron Mustang operations were conducted using the callsign DROPKICK.

Australia's contribution was initially to comprise three Mustang squadrons, one brigade of ground troops, and two examples each of cruisers and destroyers. No. 81 (Fighter) Wing was selected to be the representative RAAF unit, and duly moved from Labuan Island to Bofu on the south coast of Honshu in March 1946, after completing conversion from Kittyhawks to Mustangs. At the outset of operations in Japan, No. 81 Wing comprised a headquarters unit, Nos 76, 77 and 82 (Fighter) Squadrons, No. 481 (Maintenance) Squadron, and No. 381 (Base) Squadron, with the addition of No. 5 Airfield Construction Squadron. Later, No. 111 Fighter Control Wing would be added, bringing total RAAF personnel in Japan to approximately 1,750.

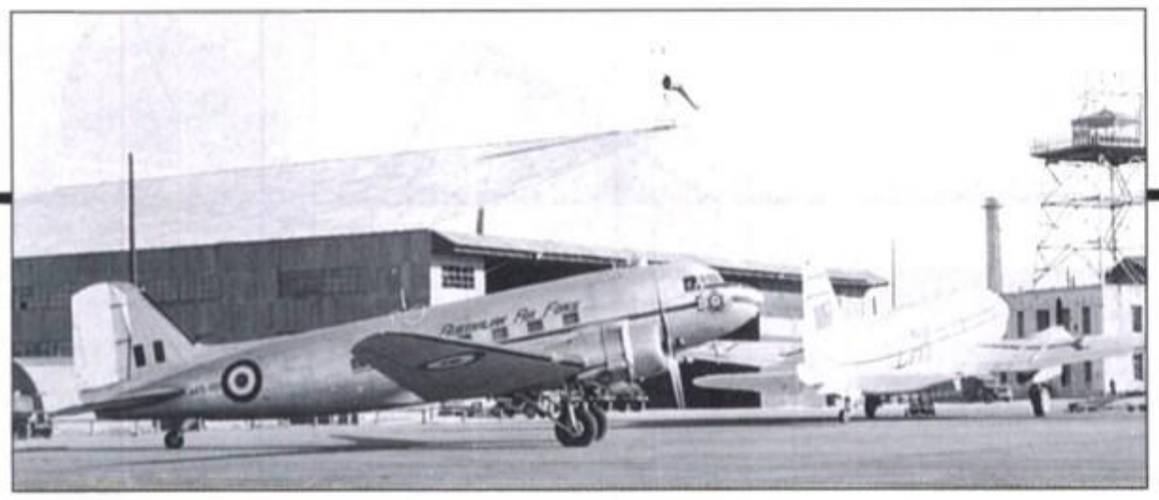
By early 1948, the withdrawal of British units attached to BCOF had begun, allowing No. 81 Wing to move to the ex-Japanese Naval Airfield of Iwakuni, approximately 18 miles (30 km) south of Hiroshima. The rundown of Australian forces in Japan also began later that year, and by the end of November only No. 77 Squadron was still in existence (with the exception of elements of No. 381 (Base) Squadron, and No. 5 Airfield Construction Squadron).

Operations from Iwakuni continued until 23 June 1950, at which time the Mustangs began to be corrosion-inhibited. The squadron began packing for its eventual return to Australia, following orders to that effect received the previous May.

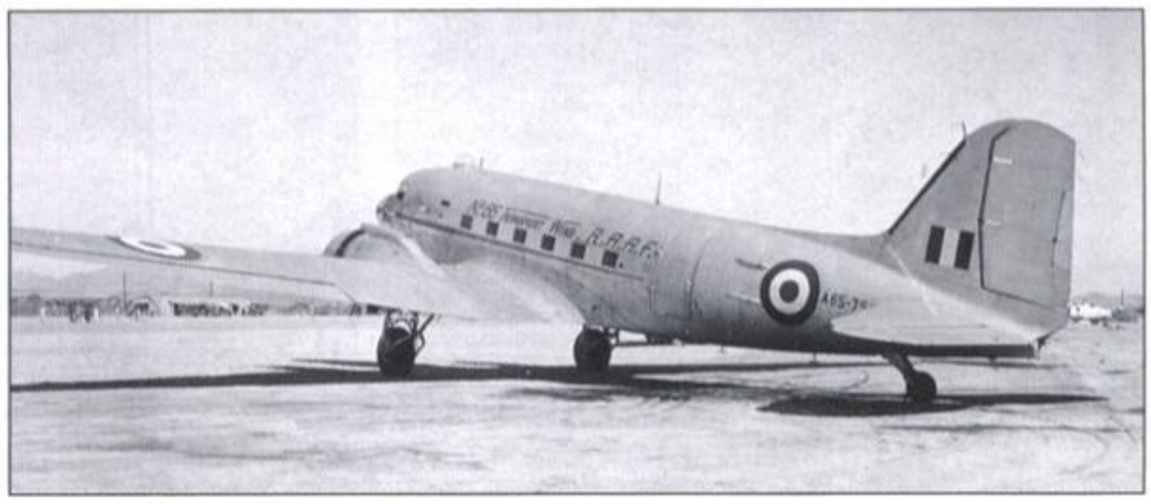
To celebrate the completion of operations, a series of boisterous farewell parties was embarked upon at Iwakuni, commencing the following evening. It was in the midst of these – at 11 o'clock on the morning of 25 June – that a call arrived from the headquarters of the USAF's 5th Air Force, informing No. 77 Squadron that North Korean forces had crossed the 38th Parallel, and the unit was to be placed on immediate stand-by for operations over the Korean Peninsula.

Thus it was that the RAAF became involved in the Korean War, with No. 77 Squadron operating as part of the US Air Force's 35th Fighter Group, 5th Air Force. The first operational sortie over the Korean landscape occurred as early as 2 July, when a flight of four Mustangs departed Iwakuni to provide escort for USAF C-47s. The first strike by No. 77 Squadron took place the following day, but ended in disaster when it was learned that the target area (between Heitaku and Suwon) allocated to the Australians by the 5th AF Headquarters had been recently reoccupied by American and South Korean troops. Although the pilots of No. 77 Squadron were not to blame, it was an ignoble beginning for RAAF operations in the conflict, and caused a degree of tension between the Allies.

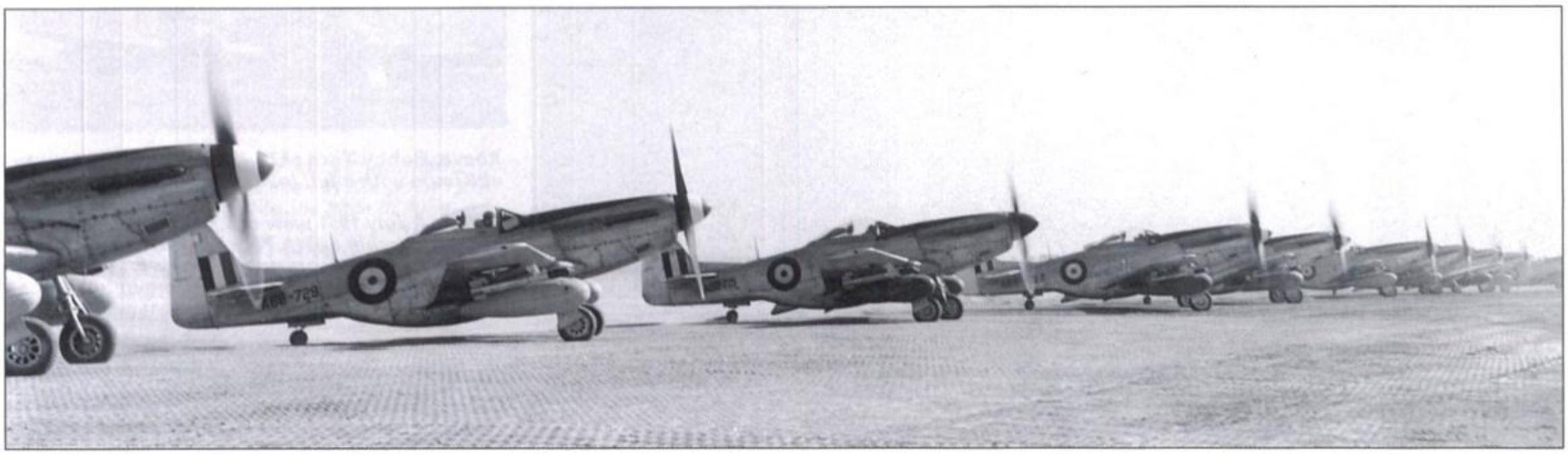
The first RAAF casualty came just five days after the start of operations, on 7 July, when the Mustang being flown by Squadron Leader Graham Strout failed to pull out of its attack



Keeping the supplies flowing was the province of the Dakotas of No. 86 Transport Wing, operating in-theatre as No. 30 Communications Unit. The Dakota below is at Suwon in the summer of 1951, while the aircraft at left taxis past a CAT C-46 at Kimpo for the flight back to Iwakuni, Japan.



Left: Before No. 16 (AOP) Flight formed in 1953 as a dedicated Air Observation Post unit, pilots destined for the flight trained on Auster Mk IIIs with No. 3 Squadron. More importantly, they also received combat experience in Korea while flying with the RAF's No. 1903 AOP Flight, one of whose Auster AOP.Mk 6s is seen here.



RAAF chronology 1 January 1950 – 31 December 1959

9 January 1950 Parliamentary approval gained for the manufacture of 48 Canberra aircraft by the Government Aircraft Factories (GAF) at Fisherman's Bend in Melbourne.
19 June 1950 No. 38 Squadron (Dakotas) arrives in Singapore as the first element of the RAAF's response to the Malayan Emergency.
25 June 1950 North Korean forces cross the 38th Parallel, Korean War begins.
30 June 1950 No. 77 Squadron at Iwakuni is committed to support UN Forces in Korea.
2 July 1950 No. 77 Squadron flies first combat mission.
7 July 1950 RAAF suffers the first casualty of the Korean War, when Sqn Ldr Graham Strout's Mustang fails to pull out of an attack run on the Samchock rail yards.
16 July 1950 No. 1 Squadron Lincolns arrive at Tengah, Singapore for duties with No. 90 (Composite) Wing during the Malayan campaign.
26 July 1950 No. 1 Squadron Lincolns fly the first RAAF strike of the Malayan Emergency.
11 October 1950 No. 77 Squadron relocates from Iwakuni to K-3 (Pohang-Dong).
Mid-October 1950 China enters Korean War.
31 October 1950 First flight of GAF Pika (manned forerunner of Jindivik).
16 November 1950 No. 77 Squadron relocates to Yongpo, to operate more closely with the USAF's 35th FG (5th AF), to which it is attached.
3 February 1951 First flight of CAC Winjeel indigenous trainer.
25 February 1951 Order for 12 P2V-5 Neptunes announced.
7 April 1951 No. 77 Squadron withdraws to Iwakuni to convert to Gloster Meteor F.Mk 8.
29 July 1951 No. 77 Squadron operates first combat sortie with the Meteor.
3 August 1951 Final CAC-Built Mustang (A68-200) handed over to RAAF.
25 August 1951 First Meteor combat loss occurs, when Warrant Officer E. D. Guthrie is shot down by a MiG-15.
9 October 1951 First two Lockheed P2V-5 Neptunes arrive at Richmond on delivery to No. 11 Squadron.
1 December 1951 Flying Officer Bruce Gogerly shoots down a MiG-15, No. 77 Squadron's first air victory since World War II, and another is credited to the squadron as a whole (for the loss of three Meteors).
4 July 1952 No. 78 (Fighter) Wing personnel depart by sea for Malta.
1 August 1950 First of an eventual seven English Electric-built development Canberras (WD939/A84-307) is handed over to the RAAF.
28 August 1952 First flight of GAF Jindivik (Mk 1 A92-5).
October 1952 RAAF Lincolns involved in sampling duties for Operation Hurricane, the British atomic test at Monte Bello Island.
29 May 1953 The first Australian-built Canberra, A84-201, makes its first flight from Avalon.
20 July 1953 No. 77 Squadron flies last Meteor combat sortie.
27 July 1953 Korean ceasefire comes into effect.
3 August 1953 First flight of prototype CAC-built Avon-powered Sabre (A94-101).
29 August 1953 Final operational flight of the Mosquito in RAAF service, when three No. 87 Squadron aircraft fly from Port Hedland and Canberra; No. 87 Squadron disbanded in December 1953.
15 October 1953 RAAF Lincolns again involved in sampling duties, this time for Operation Totem, the detonation of bombs at Emu, SA (also 27 October).
19 August 1954 Delivery of first production CA-27 Sabre (A94-901).
19 November 1954 No. 77 Squadron departs Korea.
24 January 1955 Final cadre of No. 78 (Fighter) Wing departs Malta.
21 March 1956 No. 30 Squadron disbands, leaving just two Beaufighters operational with No. 1 Air Trials Unit at Woomera.
April 1956 No. 78 (Fighter) Wing (Nos 75 and 77 Squadrons) reforms at Williamtown.
9 January 1957 Final RAAF Tiger Moth flight occurs when 10 aircraft are ferried from Point Cook to Tocumwal for storage and disposal.
July 1957 Order for 12 C-130A Hercules placed, marking the first export order for the type.
9 December 1957 The last flight of an RAAF Beaufighter is made, when A8-357 is ferried from Woomera to Edinburgh for disposal.
1 July 1958 Canberras of No. 2 Squadron arrive at Butterworth, as part of an eventual three squadrons to be allocated to the British/Australian/New Zealand Commonwealth Strategic Reserve.
2 July 1958 Australian production of the Canberra is completed with the first flight of the 48th aircraft, A84-248, from Avalon.
17 July 1958 No. 1 Squadron arrives back at Amberley, after an Australian tour to commemorate the unit's return from Malaya. Statistics for the RAAF contribution to the Malayan campaign include 33 million pounds (15 million kilograms) of bombs dropped in almost 4,000 operational sorties.
3 September 1958 No. 2 Squadron flies the first RAAF Canberra strike of the Malayan Emergency (and first-ever jet bomber strike), when four aircraft attack positions near Ipoh.
11 November 1958 Operation Sabre Ferry (the relocation of No. 3 Squadron from Williamtown to Butterworth) is completed.
13 December 1958 Arrival at Richmond of first five C-130A Hercules.
5 February 1959 Sabres of No. 77 Squadron depart Richmond, to join No. 3 Squadron in Malaya, in an operation named Sabre Ferry Phase Two.
27 April 1959 Final RAAF Wirraway flight occurs when A20-686 is flown to Tocumwal for storage and disposal.
13 August 1959 First RAAF Sabre strike of Malayan Emergency.

Flying Officer Bruce Gogerly shot down a MiG-15 on 1 December 1951. He is seen here in front of 'his' aircraft (A77-17), although he was flying A77-15 **Elyana** *for the kill.*

Pilot Officer Bill Simmonds accounted for a MiG-15 on 8 May 1952 while flying A77-385. Four days earlier Pilot Officer John Surman had downed a MiG, but it was only listed as a 'probable'.

On 27 March 1953 Sergeant George Hale notched up No. 77 Squadron's fourth kill while flying 'his' Meteor A77-851. Note the 'MiG Killer' legend written in the soot from the cannon.

Above: A pair of Meteors launches from Kimpo, with a USAF C-119 and B-26s in the background. For the first six months of operations the Meteors were employed on air-to-air missions.

Below: Indicative of the primitive conditions in Korea, this is No. 77 Squadron's ops building at Kimpo in 1953.

Above: **Bobby Toot** *(A77-728) taxis to the runway at Kimpo with a full load of 16 5-in rockets.*

Below: A July 1951 view of A77-728 shows the aircraft passing a 12th TRS RB-26C at Kimpo. At this time the Meteors were in their first month of Korea operations, and were settling in to their new base prior to beginning combat on 30 July.

dive on the railway marshalling yards at Samchok. This loss has been described as the first non-American UN casualty of the war. During the course of hostilities, No. 77 Squadron lost a total of 30 pilots (on both Mustangs and Meteors) on operations, as well as eight to non-operational flying and ground accidents, with another seven becoming prisoners of war. All losses affect the morale of the pilots and ground crews, but perhaps the greatest loss to the squadron occurred on 5 September 1950, when the popular commanding officer, Wing Commander 'Lou' Spence, failed to pull out of a napalm attack dive on the town of Angang-Ni.

Due to the distance between Iwakuni and the allocated area of operations in Korea – in which the pace of operations was increasing almost daily as UN forces advanced – it was decided to relocate No. 77 Squadron to the airfield at Pohang-Dong (K-3). The move began on 11 October 1950, and personnel immediately began to realise the hardships of living under canvas with winter looming, particularly after the comparative comfort of Iwakuni. This was followed shortly thereafter by a move to Yonpo in November, to join the other elements of the USAF's 35th Fighter Group.

Although attached to the 35th FG, No. 77 Squadron became part of an RAAF command structure formed in October 1950 and based in Japan. Known as No. 91 (Composite) Wing, the Iwakuni-based unit also included No. 491 (Maintenance) Squadron, as well as a level of in-house transport support (from 30 November) in the form of No. 30 Communications Unit, equipped with four (later to increase to eight) examples of the ubiquitous C-47 Dakota. The latter unit became No. 30 (Transport) Unit on 5 November 1951, before being renamed No. 36 (Transport) Squadron on 10 March 1953; in its various incarnations, this unit provided the necessary lifeline between Iwakuni and the Korean bases throughout the war.

After China's intervention in the war, in the middle of October 1950, things began to go badly for the Allies and they were forced to begin a retreat that would eventually see them pushed back into the southern half of South Korea. The rapid advance by Communist forces meant that No. 77 Squadron was forced to withdraw to Pusan (K-9) in December, before retiring back to Iwakuni on 7 April 1951 to begin re-equipping with the Gloster Meteor Mk 8.

With the introduction of jet-powered aircraft by both sides, it became clear to the RAAF that its Mustangs were far outclassed and would require replacement as a matter of some urgency. After much discussion with both the British and American governments, it was decided that the only aircraft type able to be procured within the timeframe desired by the RAAF was the Gloster Meteor.

As mentioned earlier, the RAAF had evaluated the Meteor F.Mk 3 in Australia shortly after World War II, but the Australian government had subsequently decided to produce the de Havilland Vampire. Unfortunately, delays to Vampire production meant that the type would not be available in sufficient time or quantity

Above: Eleven Meteor F.Mk 8s run up for a near-squadron-strength take-off from Kimpo in September 1952.

Right: A77-446 was named **Black Murray** *after its usual pilot, Flt Sgt Ken Murray, who became the high-time No. 77 Squadron Korean veteran with 333 combat sorties under his belt.*

Below right: An unarmed T.Mk 7 continuation trainer/squadron hack is seen at Kimpo in 1951. No. 77 Squadron moved to the base in June.

Below: Meteor F.Mk 8 A77-31 taxis across the PSP at Kimpo in 1952. Since January of that year No. 77 Squadron had been engaged in ground attack duties, employing the 60-lb R/Ps and cannon to great effect.

(a problem that also arose with alternative equipment from Britain and the US), so an order for 36 Meteor F.Mk 8s and 12 T.Mk 7s was placed with the British government in December 1950.

In order to gain some operational jet experience prior to the delivery of the Meteors, two pilots from No. 77 Squadron were attached to the 35th FG at Itazuke, one each to the 35th FS and 36th FS, to convert to the Lockheed F-80A Shooting Star. This conversion included 10 operational sorties on the type and provided a useful insight into the vast differences between the operation of piston-engined aircraft and the (relatively) new jets. Four RAF Meteor pilots and a number of ground crew were attached to No. 77 Squadron, to provide a pool of experience during the conversion phase. These pilots flew Mustang combat sorties with the squadron, and later moved back to Korea, flying the Meteor alongside their Australian colleagues.

The first Meteors (15 single-seat and two two-seat aircraft) were delivered to Iwakuni aboard HMS *Warrior*, arriving in February 1951. The despatch of these aircraft from the United Kingdom was supposedly a closely guarded secret, but as they were travelling as deck cargo (and noted at such places as Malta on the outward journey), their destination became common knowledge in short order.

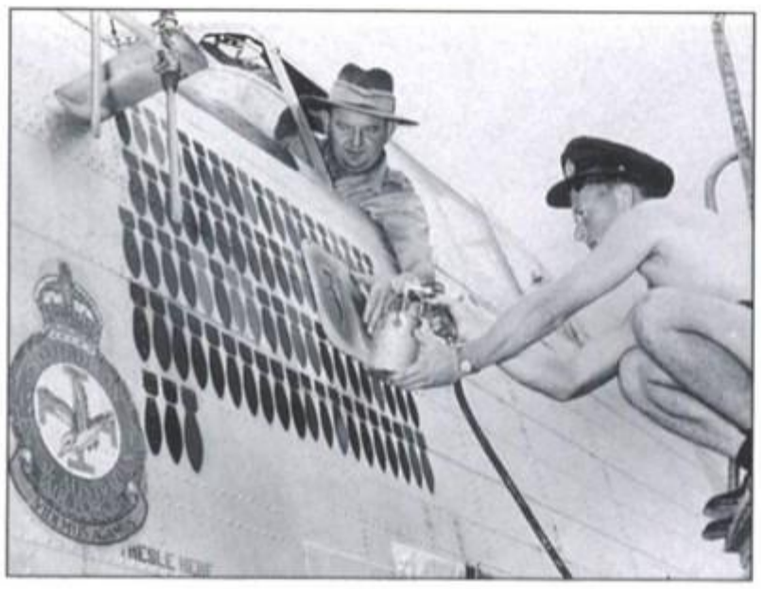
Conversion and training at Iwakuni began in April, and the squadron began to deploy to Kimpo, near Seoul, on 20 July. The earlier planned deployment had been delayed to allow for the fitment of the ARN-6 radio compass, in order to bring the aircraft into line with US Ground Controlled Approach (GCA) procedures. Not all aircraft could be modified in the timeframe required, due to a shortage of compasses, but enough aircraft had been completed by the above date to allow operations to commence with at least one ARN-6-equipped aircraft in each flight.

Meteor operations began with an uneventful fighter sweep over the Yalu River on 29 July 1951. The first air combat occurred on 25 August, but it was an indecisive engagement. The enemy drew first blood four days later when Warrant Officer E. D. Guthrie was shot down by a MiG-15 in the vicinity of Chongu.

Although history recorded that the Meteor was outclassed as a fighter by the swept-wing MiG-15 and F-86 series, it did have some advantages, particularly its higher rate of climb at lower altitudes. A comparison between the Meteor and an F-86 from the 4th FIW (flown by an RAF exchange officer) had been made the previous May, and the Australians were understandably keen to engage the MiG-15 in air-to-air combat.

First victory since World War II

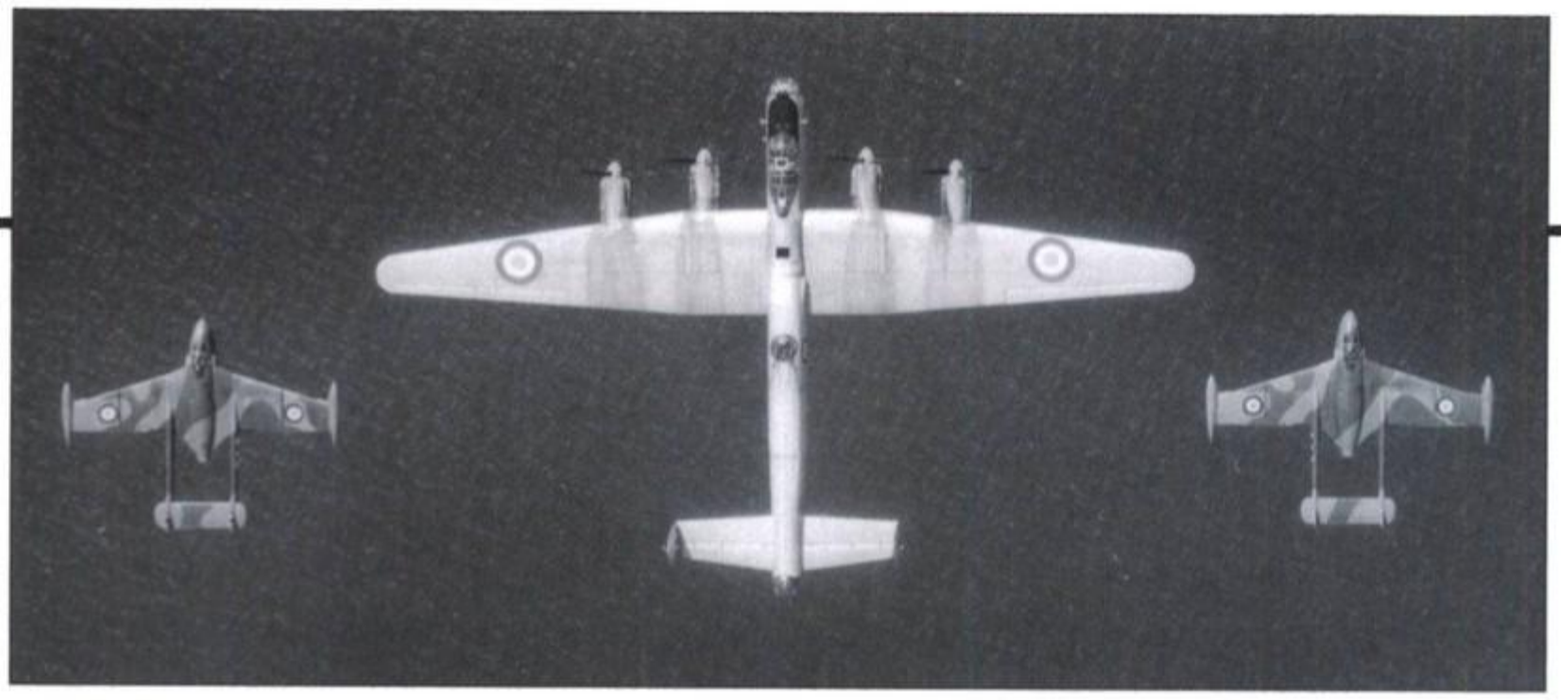
It was not until 1 December that No. 77 Squadron scored its first aerial victory since World War II, in what was to be its final fighter sweep. Twelve of the squadron's Meteors were attacked by a force of some 40 MiG-15s, and in the ensuing mêlée Flying Officer Bruce Gogerly shot down one opponent and the



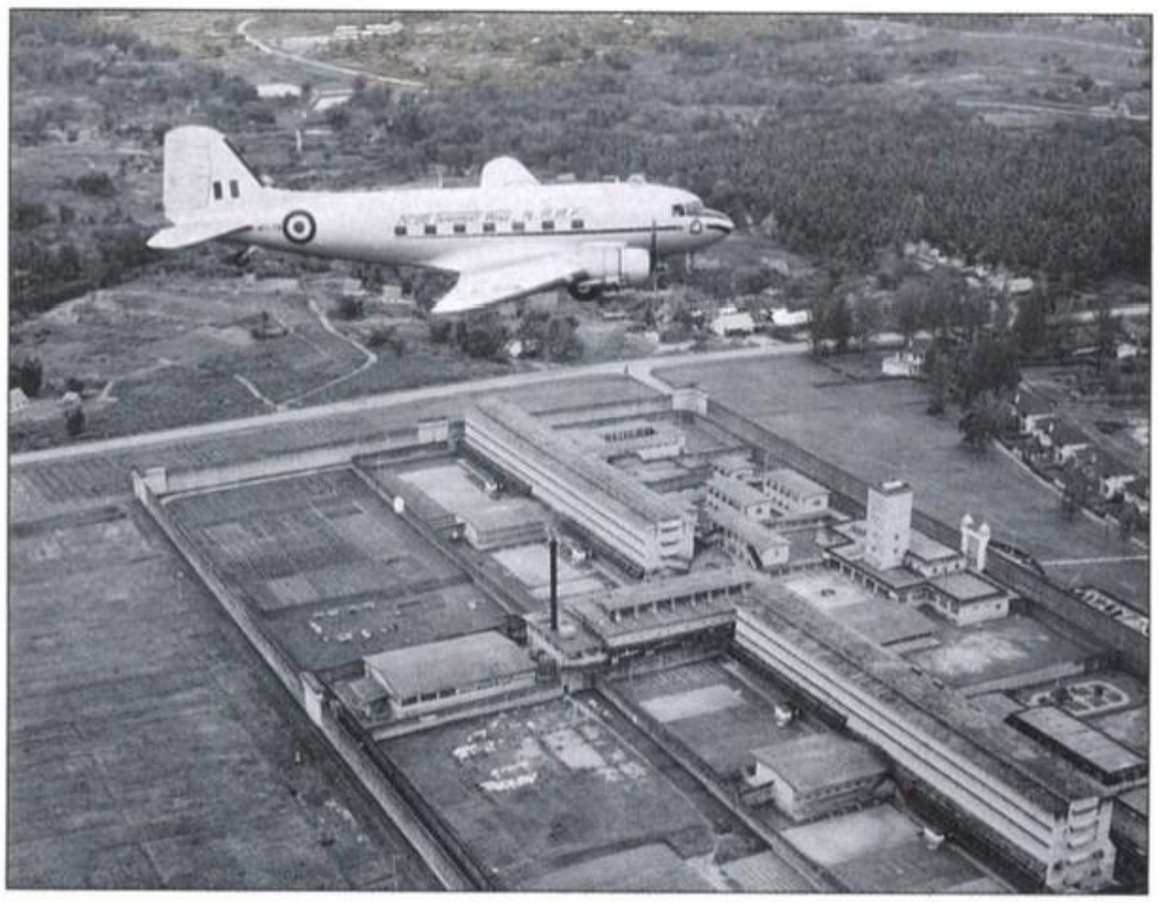
Above: Another mission is marked on this No. 1(B) Squadron Lincoln. The lighter symbols (red) represented night missions: the black symbols were for daytime attacks.

Right: Local airfield workers pause to witness the impressive sight and sound of a Lincoln taxiing for a mission. In the background is an RAF Bristol Brigand.

Below: Returning from a supply drop over the Malayan jungle, a No. 38 Squadron Dakota overflies the notorious Changi prison, adjacent to the aircraft's Singaporean base.



Above: Two RAF Venoms flank a Lincoln B.Mk 30 of No. 1(B) Squadron during a September 1955 sortie from Tengah.



Below: The Dakota was the principal RAAF beast of burden in Malaya. This example passes a junk on its way to Butterworth. The base was built, virtually from new, beginning in late 1955.

Above: No. 1 Squadron Lincolns line the ramp at Tengah. The unit flew nearly 4,000 combat sorties, and was the backbone of the FEAF bombing effort throughout the Malayan Emergency.

squadron as a whole was credited with the destruction of another. The balance of accounts was still in the enemy's favour, however, three Meteors being lost during the engagement.

As a result of the Meteor's shortcomings as a fighter, No. 77 Squadron was relegated to the escort of B-29s, combat air patrols over the main supply routes, and airfield defence of Kimpo. Never again were Meteors to venture north to the Yalu River in the hope of air combat with MiG-15s.

The mundane tasking took its toll on squadron morale, but with the arrival on 26 December 1951 of a new commanding officer, Squadron Leader R. T. Susans, things began to improve. The Meteor had never been cleared to fire the air-to-ground rocket projectiles (R/Ps) by the RAF, but they were fitted at squadron level and tested in short order. At Susans's request, No. 77 Squadron assumed the ground attack role from January 1952, with the first (extremely successful) rocket-firing sortie flown on 7 January. The Meteor settled in to the ground attack role with a great deal of success, the sturdy airframe and accurate rocket-firing attributes at low level bringing a new lease of life to No. 77 Squadron.

This was the way things were to remain, with No. 77 Squadron carving an enviable reputation for dependability and accuracy on ground attack and armed reconnaissance duties right up to the armistice. Flying ground attack sorties did not prevent the pilots from joining combat when the opportunity arose, however, and another MiG-15 was shot down by Sergeant George Hale while on a reconnaissance mission near Namch'onjom on 27 March 1953. In all, No. 77 Squadron lost four Meteors to the MiG-15s, but claimed the destruction of five of the latter in return. Another 23 Meteors were destroyed by ground fire. The armistice was signed on 27 July 1953, and on that date the squadron flew its last operational flight, the final strike having occurred a week earlier on 20 July.

The end of the Korean War did not mean immediate withdrawal to Australia, and No. 77 Squadron remained at Kimpo to support the UN-monitored ceasefire until finally being relocated to Iwakuni in November 1954. From there, the Meteors were inhibited, as the Mustangs had been some three years earlier, and were loaded aboard HMAS *Vengeance* for the trip to Australia. This time there was no recall, and No. 77 Squadron finally arrived home in time for Christmas 1954.

Once de-preserved, the Meteors were issued to Nos 75 and 77 Squadrons (No. 78 Wing) at Williamtown, to provide the squadrons with jet experience until the introduction of the Sabre in 1956. Two Citizen's Air Force squadrons, No. 22 (City of Sydney) and No. 23 (City of Brisbane) also operated the Meteor in the post-Korea years, until they were reduced to non-flying status in 1960.

Malaya

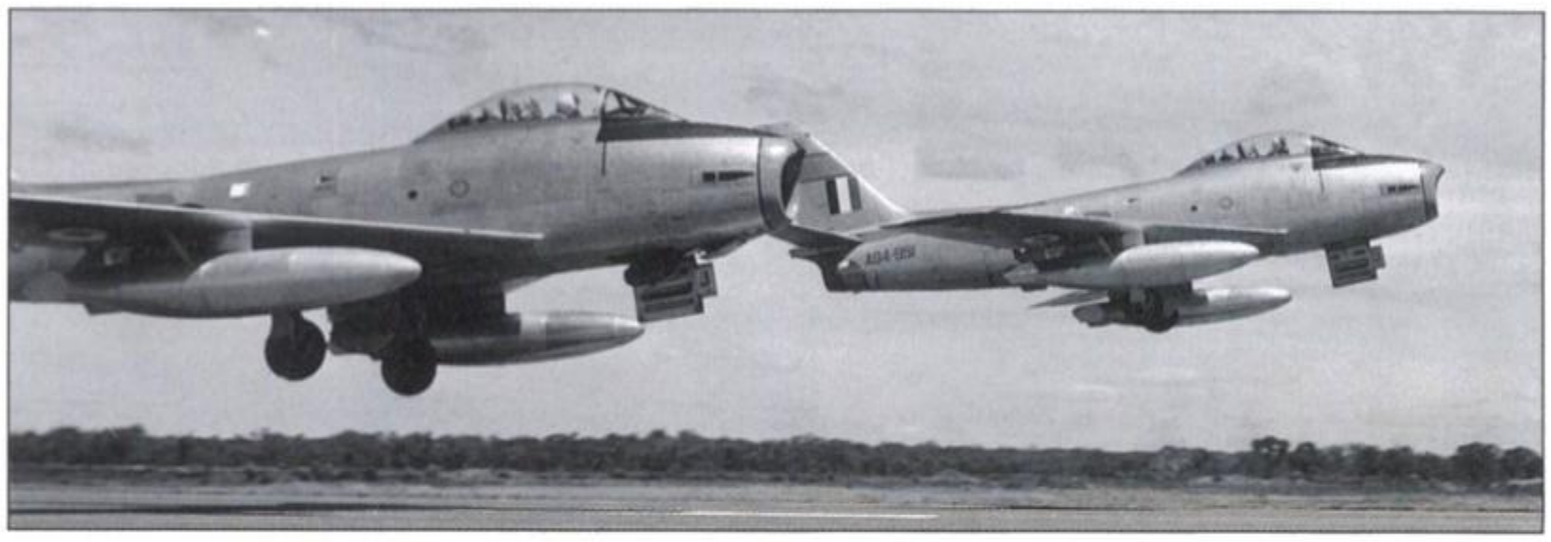
RAAF involvement in the Malayan Emergency predated that in Korea, with the arrival of eight Dakotas of No. 38 Squadron at Changi on 19 June 1950, to operate as a component of the British Far East Air Force (FEAF). Australian participation in the

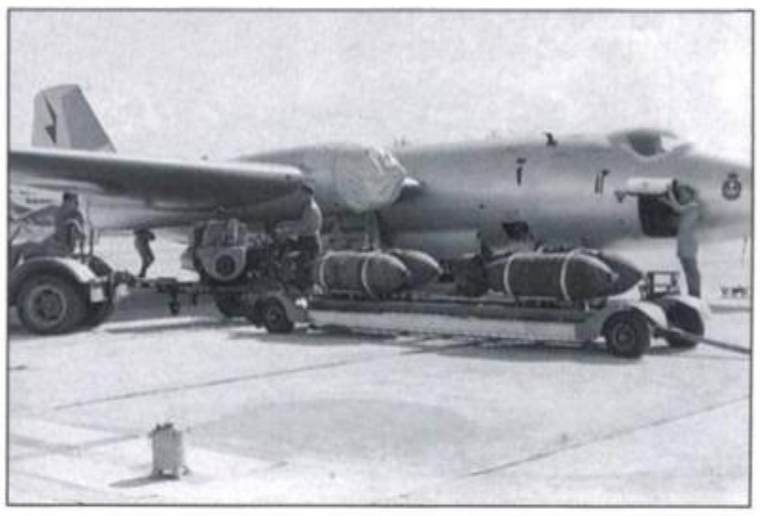
Above: Sabre Mk 32s of No. 78 Wing are seen on the ramp at Butterworth. The aircraft in the foreground are from No. 3 Squadron; those in the background from No. 77. Two of the wing's three squadrons were usually deployed to Malaya.

Above: Sixteen Merlins churn the humid Southeast Asian air as a flight of Lincolns sets out from Tengah on a mission over Malaya.

Right: A pair of No. 3 Sqn Avon-Sabres takes off from Williamtown during practice for the long ferry flight to Malaya in late 1958. The aircraft routed Williamtown – Townsville – Darwin – Biak – Guiuan – Labuan – Butterworth.

Below: With the hills of Penang in the background, No. 2 Squadron's newly-arrived Canberra B.Mk 20s line the ramp at the recently completed base at Butterworth. The Canberras arrived in June/July 1958, allowing the Lincolns of No. 1 Squadron to withdraw.





Above: A Canberra is bombed-up with 1,000-lb weapons prior to the type's first action on 3 September 1958. The final bombing sortie was flown in January.

campaign known to the British as Operation Firedog lasted eight years, and witnessed the deployment of seven flying squadrons.

Operational flying did not begin until 21 July, almost three weeks after the commencement of combat operations in Korea, due to the need for initial familiarisation flying. From that date, the Dakotas became a familiar sight throughout Southeast Asia, and were not confined merely to the resupply of ground troops in Malaya.

During this period, the RAAF found itself hard-pressed to meet airlift demands at home and abroad. As a result of the urgent need for transport support in the Korean theatre, four of No. 38 Squadron's Dakotas were despatched to Iwakuni in November to form No. 30 (Communications) Unit. Malayan operations continued from Changi (apart from a temporary relocation to Kuala Lumpur between April 1951 and February 1952), until the squadron was finally withdrawn to Australia on 8 December 1952.

When the Dakotas departed Changi for the homeward journey to Richmond, No. 38 Squadron had flown more than 1800 tons (1829 tonnes) of freight (an additional 805 tons/762 tonnes was airdropped), and carried over 17,000 passengers.

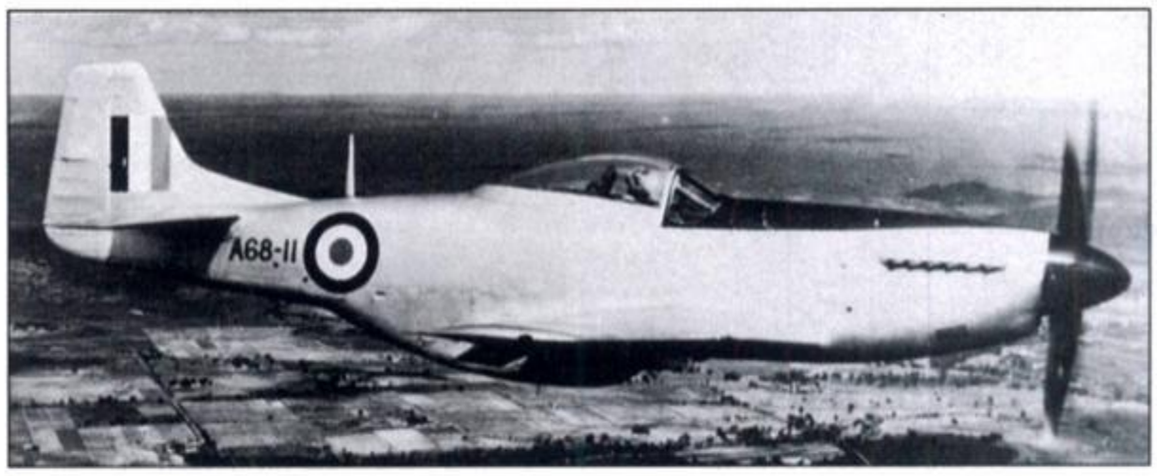
Perhaps the best known RAAF presence in Malaya – certainly the longest-participating – was No. 1 Squadron, equipped with the GAF-assembled Lincoln Mk 30/30A. These heavy bombers, from Amberley's No. 82 Wing, arrived in Singapore on 16 July 1950 and began bombing sorties 10 days later. The decision to include No. 1 Squadron was announced in Australia during the last week of June 1950, the same week in which hostilities began in Korea. With the arrival of the second RAAF unit in Singapore, a decision was made to form No. 90 (Composite) Wing as a parent unit, rather than have Australian squadrons subordinate to British command.

Lincoln operations were flown continuously from Tengah, until No. 1 Squadron was withdrawn to Amberley in July 1958, almost at the end of the campaign. During the eight years of operations, the squadron earned itself a reputation for accuracy and reliability, no easy task when it is considered that (particularly in the later years) the Lincoln was hardly in its flush of youth, and the humid tropical environment did nothing for the well-being of either man or machine. Bombing of suspected Communist Terrorist positions was carried out both by day and night, No. 1 Squadron reportedly being the only FEAF unit cleared for night operations.

By the end of its tenure in Singapore, No. 1 Squadron had flown approximately 4,000 bombing missions and dropped almost 15,250 tons (15,495 tonnes) of bombs, an estimated 85 per cent of the FEAF total. To this must be added the leaflet dropping and training performed during the period, not least of which was the participation in several SEATO exercises. Only two aircraft were lost (neither due to enemy action), and another was repatriated to Australia for repair after a flare hung up in the bomb bay.

No. 1 Squadron's duties were taken over by the Canberra-equipped No. 2 Squadron, which arrived at Butterworth in June 1958 (followed

Right: This Meteor T.Mk 7 served with No. 23 Squadron, as denoted by the unit marking on the drop tank.



Above: A68-11 was a CA-17 Mustang Mk 20 which served with No. 25 (City of Perth) Squadron. The CAF squadrons were located near to the five main Australian cities.

Above: No. 78 Wing operated RAF-supplied Vampire FB.Mk 9s from Malta during 1952-54. This aircraft has been daubed with a temporary distemper to act as an 'aggressor' during exercises.

Left: Groundcrew try heroically to overturn Meteor T.Mk 7 WH220 to rescue the rear-seat occupant after a crash at Hal Far on 18 January 1954. The pilot escaped relatively unhurt, but the passenger perished.

Below: A Wirraway of No. 21 Squadron shares the apron with a CAC Mustang, probably from No. 24 Squadron. Both wear the kangaroo national insignia adopted in 1956.

later by the Sabres of Nos 3 and 77 Squadrons) as part of Australia's contribution to the Commonwealth Far East Strategic Reserve. The Canberras flew their first bombing sortie on 3 September 1958 (marking the RAAF's first jet bomber mission) with a four-aircraft strike on Communist positions near Ipoh. Operations were brief, however, the last sortie being flown in January 1959, but the following decade was to see the squadron (and the Canberra) return to Southeast Asian combat operations in Vietnam.

Not to be outdone, the Sabres of both Nos 3 and 77 Squadrons managed to fly strikes in Malaya, beginning on 13 August 1959. By then, though, the conflict was almost over, and an end was finally declared on 31 July 1960.

With the creation of the aforementioned Far East Strategic Reserve, RAAF squadrons were based at Butterworth until the disbandment of No. 79 Squadron (Mirage IIIO) in 1988. In 2000, an RAAF presence is still maintained with regular deployment of Hornets, Orions and F-111s.

Malta

As if the burden of simultaneous operations in Korea and Malaya were not pressing enough, it was announced in March 1952 that the Australian government would provide a fighter wing to operate as a component of the RAF's Middle East Air Command, in the defence of Malta. This decision was both political and strategic, as the British were stretched thinly in a region of significant tension (the Suez Crisis was to develop four years later), and Australia saw the Middle East as an area of wartime responsibility, due to the perception that it was a vital link in the communications chain with Britain. No doubt, this decision was influenced by the British government's offer to lease sufficient jet fighters to equip two squadrons, should Australia participate.

As a result, No. 78 (Fighter) Wing comprising Nos 75 and 76 (Fighter) Squadrons, No. 378 (Base) Squadron and No. 478 (Maintenance) Squadron was despatched by sea to the Royal Naval Air Station at Hal Far. Once on Malta, the two fighter squadrons re-equipped with 18 British-supplied Vampire FB.Mk 9s and a pair of Meteor T.Mk 7s (two-seat Vampires were in short supply), though operations in Korea, and the need to adequately man Australian units, meant that each squadron could only operate about eight aircraft.

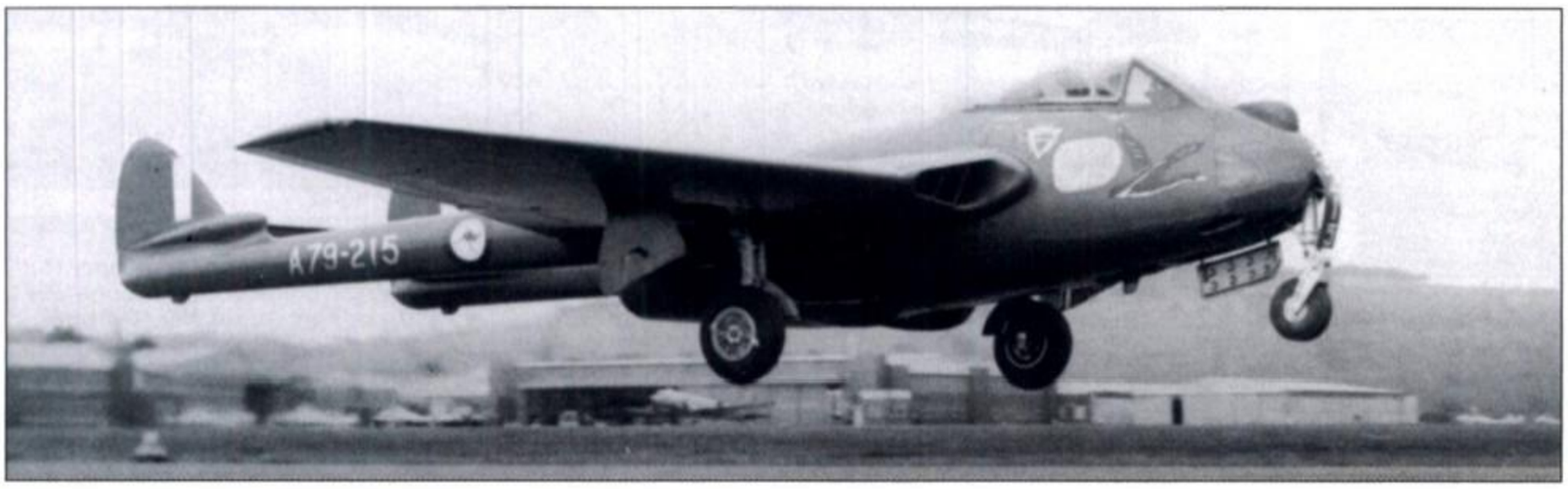
As part of a similar arrangement, No. 14 Squadron RNZAF was based in Cyprus at this time, and would have become the third squadron of No. 78 Wing should hostilities have eventuated. This arrangement was to be exercised on several occasions during the next two years.

Flying began on 11 August 1952, and soon the aircraft were a familiar sight around Mediterranean airfields. The highlight of the tour occurred in May 1953, when a deployment to the United Kingdom took place. The reason for the trip was to represent No. 78 Wing at the Coronation Review at RAF Odiham on 15 July. Later in the deployment, No. 78 Wing was able to gain invaluable NATO interoperability experience in Germany during Exercise Coronet.

During the period in which the bulk of the wing was in the UK, personnel remaining on Malta oversaw the move from Hal Far to Ta'Qali in June. The latter airfield remained the home of No. 78 Wing until a change in Australian government policy, placing an increased emphasis on Southeast Asia, brought an end to flying operations in December 1954. The aircraft were subsequently returned to the RAF, and departure to Australia commenced in January 1955.

Citizen's Air Force squadrons

The concept of a Citizen's Air Force (CAF)

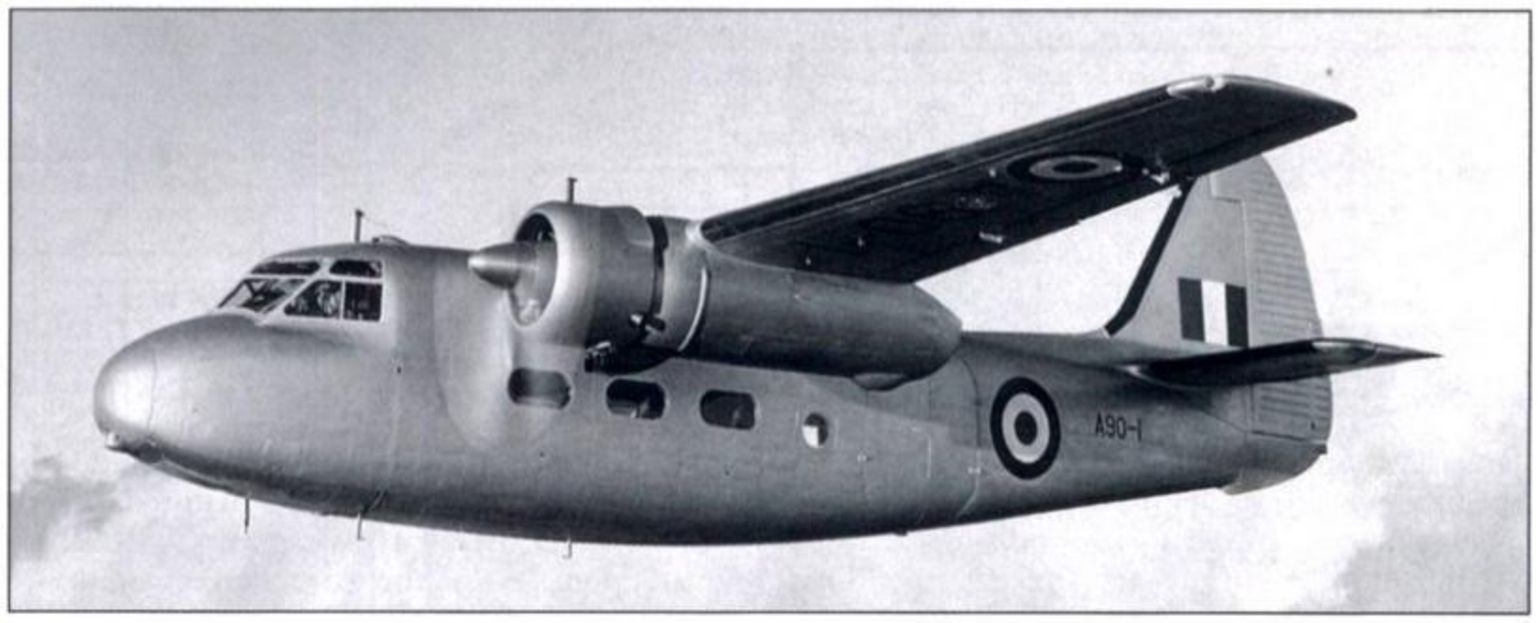


Above: Based at Laverton, No. 21 (City of Melbourne) Squadron was one of four Citizen's Air Force units to operate the Vampire on home defence duties.

Left: With the exception of nose-art in Korea, non-standard markings were extremely rare on 1950s RAAF aircraft. Between 1957 and 1959 the CO of No. 25 Squadron flew this bright red Vampire FB.Mk 31, complete with large swan insignia below the cockpit.

Right: Three Princes were flown by No. 34 (Special Transport) Flight (later Squadron) on communications duties from Woomera.

A single Viking was loaned to the RAAF in 1948, serving primarily on the route between Edinburgh and Woomera. It was returned to the RAF in October 1951.



in Australia can be traced as far back as 1918, almost three years before the formation of the permanent air force in 1921. It was not until 1936, after a period of operations with 'composite' squadrons manned by both permanent and part-time personnel, that Citizen's Air Force Squadrons began to form in their own right. These squadrons were formed in a similar fashion to the RAF Auxiliary Air Force squadrons, drawing personnel from the city (and state) whose name they bore.

The first two squadrons – No. 21 (City of Melbourne) and No. 22 (City of Sydney) – were formed on 20 April 1936, followed by No. 23 (City of Perth) on 3 May 1937. The latter unit was renumbered No. 25 Squadron in 1939, allowing a second No. 23 Squadron (City of Brisbane) to form on 1 January 1939. The final unit, No. 24 Squadron, formed in June 1940 after the outbreak of World War II, and therefore did not become a Citizen's Air Force unit until its reformation as No. 24 (City of Adelaide) Squadron in 1951.

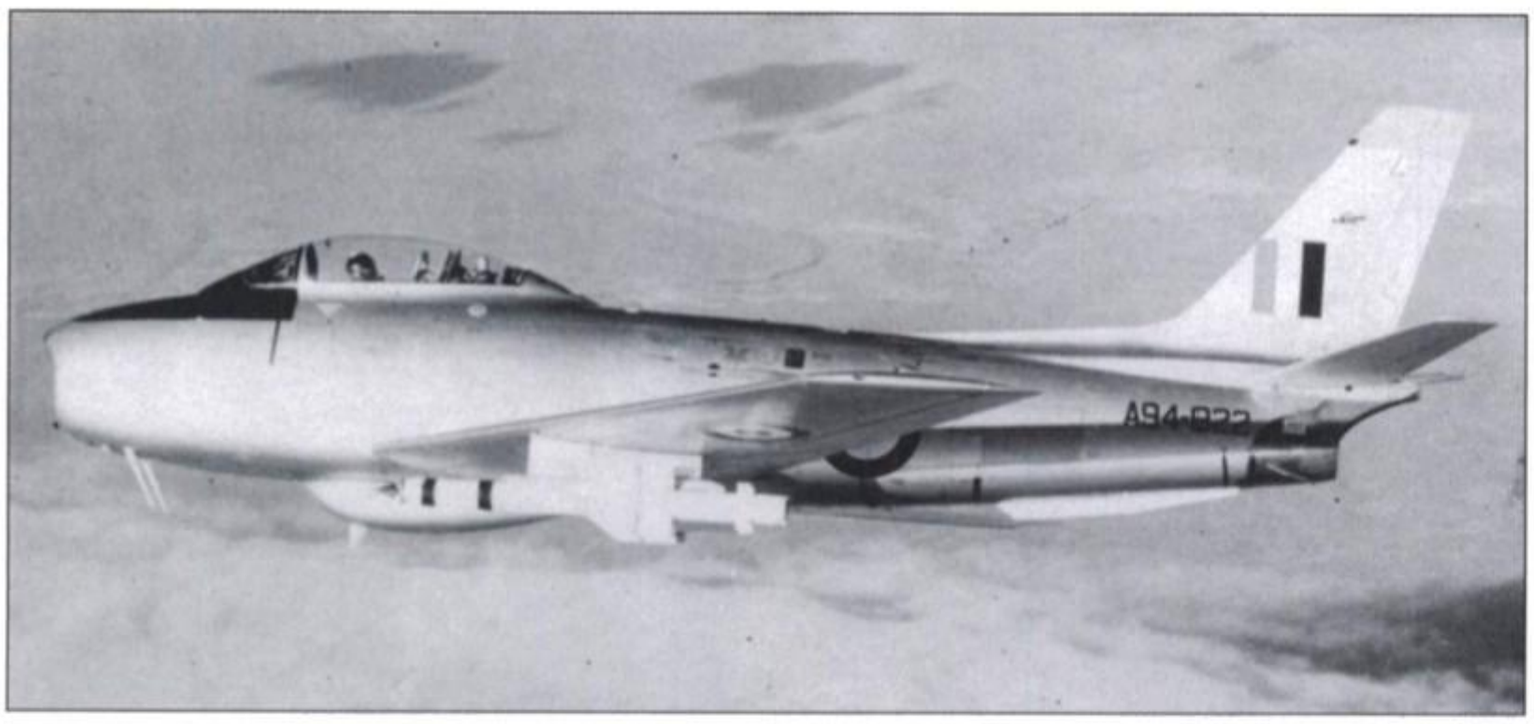
Initially equipped with a miscellany of second-line and support types, such as the Hawker Demon and Avro Anson, the squadrons were mobilised at the outbreak of World War II and were not formed again as Citizen's Air Force units until 1948 (or 1951, in the case of No. 24 Squadron).

The 1950s were the heyday of the CAF units, all initially being equipped with the CAC Mustang, Wirraway and (in most cases) de Havilland Tiger Moth. An interesting addition to the fleets of Nos 21, 22 and 23 Squadrons was the Sikorsky S-51 helicopter, in an apparent attempt to provide Australia-based CAF units with SAR support. In the end, this idea did not mature, and only three S-51s were included in the RAAF inventory.

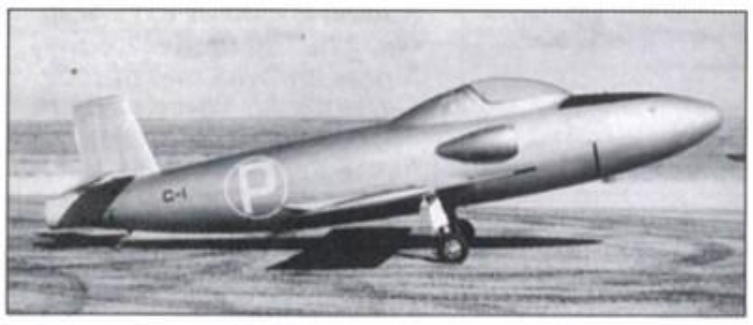
Re-equipment with jets kept the Citizen's units in touch with their permanent air force counterparts, especially with the introduction of the Home Defence Force principle. Nos 21 and 25 Squadrons converted to Vampires in September 1951. No. 22 Squadron re-equipped a year later, in September 1952, and No. 23 Squadron followed suit in 1955. The latter two squadrons had their Vampires supplanted (and in the case of No. 23, replaced) by surplus Meteor F.Mk 8s/T.Mk 7s. Only No. 24 Squadron saw out the decade with the Mustang.

CAF *esprit de corps*

Outclassed by the permanent air force with the introduction into service of the CAC-built, Avon-powered Sabre, the CAF squadrons nonetheless retained a unique *esprit de corps* and could be rightly proud of their achievements. This was not to last, and it was announced in

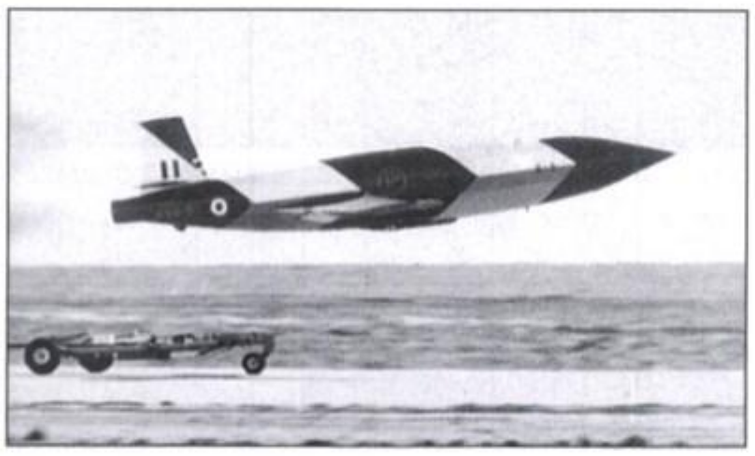


This Sabre Mk 31 served with ARDU and was employed on behalf of the UK MoD on Firestreak air-to-air missile trials in 1956/57. A non-standard belly fairing contained test equipment, and the aircraft was fitted with a ventral strake.



Above: Project 'C' was the manned version of the pilotless drone (hence the 'C-1' serial) but was better known as the GAF Pika.

Below: The first of two Pikas crashed at Woomera on 5 April 1951 and was subsequently broken up. The second aircraft survives as an exhibit in the RAAF Museum at Point Cook.



Above: The first flight of the GAF Jindivik (Project 'B') drone was made on 28 August 1952 using this aircraft, A92-5 (also the serial 'B-5').

Above: Operated on loan from the UK was a single Sea Hornet TT.Mk 20 (A83-1 ntu, TT213), which arrived in June 1948 for tropical trials. It returned to the Royal Navy in October 1951.

Above: All three RAAF S-51s are seen at Laverton in 1951. The S-51s were delivered from 1947 and were an early attempt to provide SAR cover around the major cities, serving with Nos 21, 22 and 23 Squadrons.

Above: One of only two Sycamore Mk 4s operated by the RAAF is seen at Woomera in the early 1960s. The Meteor test aircraft include D.Mk 16 drones.

Above: Two ex-RAF Boeing Washingtons were flown by the RAAF, although they retained their RAF serials. They were operated from late 1952 by the ARDU Trials Flight on various test duties at Edinburgh and Woomera. This aircraft is seen after retirement to the storage airfield at Tocumwal where it was scrapped in the 1960s.

January 1960 that all CAF flying would cease the following April, with the units to take on an auxiliary status, supplying ground support to an affiliated permanent air force unit. This arrangement has lasted until the present day, with the sole exception being a brief revival enjoyed by No. 25 Squadron in the early 1990s, flying the MB.326H.

Weapons Research Establishment

Formed in conjunction with the British government and Ministry of Defence, the Weapons Research Establishment at Woomera, in outback South Australia (including the range head airstrip at Evans Head), provided a testing ground for all manner of military and scientific equipment – from pilotless aircraft to various guided weapons – and led to the launching of satellites in the following decade. A detailed examination of the WRE is outside the scope of this article, but it is interesting to note the miscellany of aircraft types that were brought on RAAF charge as a result of its work.

The initial RAAF component, the Long Range Weapons Establishment, was formed in February 1948, charged with the preparation of the range and the testing and maintenance of domestic facilities at Woomera, allowing Detachment 'A' of the Aircraft Research and Development Unit (ARDU) to commence trials in July 1950. From the time Woomera was selected as the site, No. 34 (Communications) Squadron began operating courier services between Mallala, Edinburgh and Woomera with a diverse selection of aircraft types (including the Prince, Viking, Valetta and Bristol Freighter). The resident section, the ARDU Trials Flight (ATF), was renamed the Air Trials Unit (ATU) in January 1955, becoming No. 1 Air Trials Unit in April 1958. An esoteric mix of types was operated, with aircraft such as the Beaufighter, Lincoln, Meteor, Canberra, Winjeel, Bristol Freighter and Beaver appearing on the books. Even more exotic, perhaps, were the RAF/RN types flown during the period, including Washingtons, Sea Vixens and a Valiant.

No. 1 ATU tested weapons and systems such as Fire Flash, Blue Jay, Sea Slug and Red Top during the decade, in addition to the aforementioned pilotless aircraft trials with Meteors, Canberras and Jindiviks.

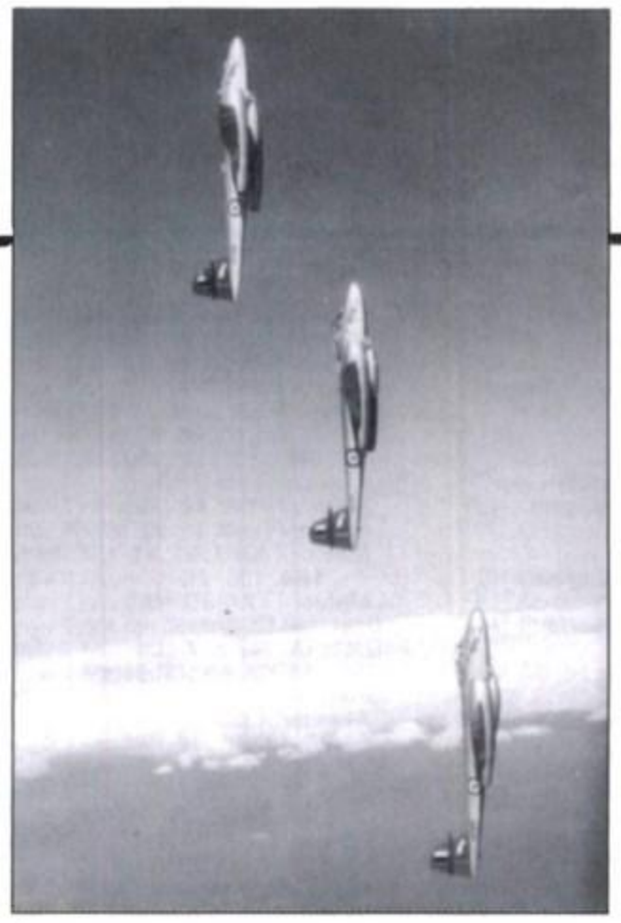
In March 1958, Detachment 'A' of the ATU became No. 2 ATU at Edinburgh, as the emphasis on trials shifted from Woomera to the latter base. This unit joined No. 1 ATU in trials work, again with a diverse aircraft mix, participating in such projects as bomb ballistics, the Folland ejection seat development and Ikara (anti-submarine rocket) trials.

Nuclear testing

RAAF participation in the British nuclear testing programme involved range security flights, meteorological reconnaissance and atomic cloud sampling (by Lincolns and Dakotas) at Monte Bello (October 1952, and mid-1956), Emu (October 1953), and Maralinga (September/October 1956, and September/October 1957). As a result of the tests at Emu, four of No. 82 Wing's Lincolns were taken out of service and dumped, as they were deemed to be too radioactive for safe use.

Antarctic service

The RAAF Antarctic Flight was formed on



Left: The 'Meteorites' aerobatic team formed in September 1955 and flew displays around eastern Australia until the following year. The team disbanded when the CAC Sabre replaced the Meteor. The team represented Williamtown's No. 78 Wing, comprising Nos 3, 75 and 77 Sqns.

Below: Ski-equipped C-47B A65-81 joined the Antarctic Flight at the end of 1959 and was christened **Ann Cherie**. *The 'ANARE' initials stood for Australian National Antarctic Research Expedition. The aircraft was destroyed in a blizzard on 8 December 1960 while parked at the Rumdoodle airstrip.*

An Antarctic Flight Beaver I is seen refuelling from drums on the King Edward VII Gulf ice in 1958, during that year's trans-Antarctic expedition with RAF and RNZAF aircraft. In the background is one of two Auster AOP.Mk VIs used by the Antarctic Flight. Note the 'rampant' kangaroo roundel on the Beaver.

Above: As well as Antarctic duties the Beaver also flew on trials support duties with 2 ATU. This example demonstrates its float undercarriage capability.

Right: Sadly, the original RAAF caption writer for this photo of a snowed-in ANARE Beaver failed to record the significance, if any, of the frozen (or stuffed?) penguin by the strut.

RAAF ORDER OF BATTLE, 31 DECEMBER 1959

UNIT	EQUIPMENT	RÔLE	BASE
No. 1 Squadron	Canberra	bomber	Amberley, Queensland
No. 2 Squadron	Canberra	bomber	Butterworth, Malaya
No. 3 Squadron	Sabre	fighter	Butterworth, Malaya
No. 6 Squadron	Canberra	bomber	Amberley, Queensland
No. 10 Squadron	Lincoln	maritime reconnaissance	Townsville, Queensland
No. 11 Squadron	P2V-5 Neptune	maritime reconniassance	Richmond, NSW
No. 21 Squadron*	Vampire, Winjeel	CAF	Laverton, Victoria
No. 22 Squadron*	Vampire, Meteor	CAF	Richmond, NSW
No. 23 Squadron*	Vampire, Meteor, Winjeel	CAF	Amberley, Queensland
No. 24 Squadron*	Mustang, Winjeel	CAF	Mallala, South Australia
No. 25 Squadron*	Vampire	CAF	Pearce, Western Australia
No. 34 Squadron	Convair 440, Dakota	special (VIP) transport	Canberra, ACT
RAAF Canberra renamed RAAF Fairbairn 1961			
No. 36 Squadron	C-130A Hercules	transport	Richmond, NSW
No. 38 Squadron	Dakota	transport	Richmond, NSW
No. 75 Squadron	Sabre	fighter	Williamtown, NSW
No. 77 Squadron	Sabre	fighter	Butterworth, Malaya
ARDU	various	trials	Laverton, Victoria
1 ATU**	Sycamore, Beaver	trials/support	Woomera, South Australia
2 ATU**	Bristol Freighter	trials/support	Edinburgh, South Australia
16 (AOP) Flt	Auster, Cessna 180A	army cooperation	Canberra, ACT
disbanded 30/11/60, reformed as 16 Army Light Aircraft Squadron at Amberley 01/12/60 (combined RAAF/Army unit)			
Antarctic Flt	Dakota, Beaver	ANARE support	East Sale, Victoria
1(B) OCU	Canberra	bomber conversion	Amberley, Queensland
2(F) OCU	Vampire, Sabre	fighter conversion	Williamtown, NSW
CFS	Vampire, Winjeel, Canberra, Dakota	instructor training	East Sale, Victoria
1(B) FTS	Winjeel	basic training	Point Cook, Victoria
1 AFTS	Vampire	advanced training	Pearce, Western Australia
SAN	Dakota	navigator training	East Sale, Victoria

** Citizens Air Force Squadrons would relinquish their flying roles in June 1960*
*** Nos 1 & 2 Air Trials Units operated on behalf of the Weapons Research Establishment (WRE)*

By the end of the decade, the Area Command principle had been replaced by the following Commands, reporting to the Department of Air: Home Command (Operational Units), Training Command and Maintenance Command. Within these Commands, various Operational Squadrons were organised into the following Wing structure:

82 (Bomber) Wing – Amberley – Nos 1, 2 and 6 Sqns, No. 1(B) OCU
78 (Fighter) Wing – Williamtown – Nos 3, 75 and 77 Sqns
Nos 3 & 77 Sqns based in Malaya
86 (Transport) Wing – Richmond – Nos 36 and 38 Sqns

4 January 1955 (the RAAF having previously assisted Antarctic expeditions in 1948), initially equipped with two Austers. These aircraft were shipped south the following month, but had to be rebuilt into a single aircraft after being damaged aboard ship before arrival. Operations were carried out from 1955 on behalf of the Australian National Antarctic Research Expedition (ANARE). Beavers soon replaced the Auster(s), and a single Dakota was added at the end of 1959. Antarctica is a hostile continent, and several aircraft, including the Dakota, were lost in blizzards while tethered to the ice. Antarctic operations were finally handed over to the Department of External Affairs in 1963.

Aerobatic teams

The final part of this review takes a fleeting look at the aerobatic teams formed by the RAAF between 1950 and 1959. Details are sparse, unfortunately, and therefore only a brief summary of each team is listed separately.

Nigel Pittaway

Team	Unit	Equipment	Dates of Service
unnamed	78 Wing (Malta)	Vampire FB.Mk 9	1953-11/54
'Meteorites'	78 (Fighter) Wing (Nos 75 and 77 Sqns)	Meteor F.Mk 8	9/55-1956
unnamed	3 Sqn	Sabre	c.1957
'Red Devils'	2 OTU	Vampire FB.Mk 31	c.1958
'Red Eagles'	21 Sqn	Vampire FB.Mk 31	c.1959
'Aerobats'	RAAF College	Winjeel	c.1959
unnamed	78 Wing (Butterworth)	Sabre	9/59

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